DeepMedia.AI

Pioneering Synthetic Generation and Detection

Empowering Research with AI-Driven Media Forensics and Detection

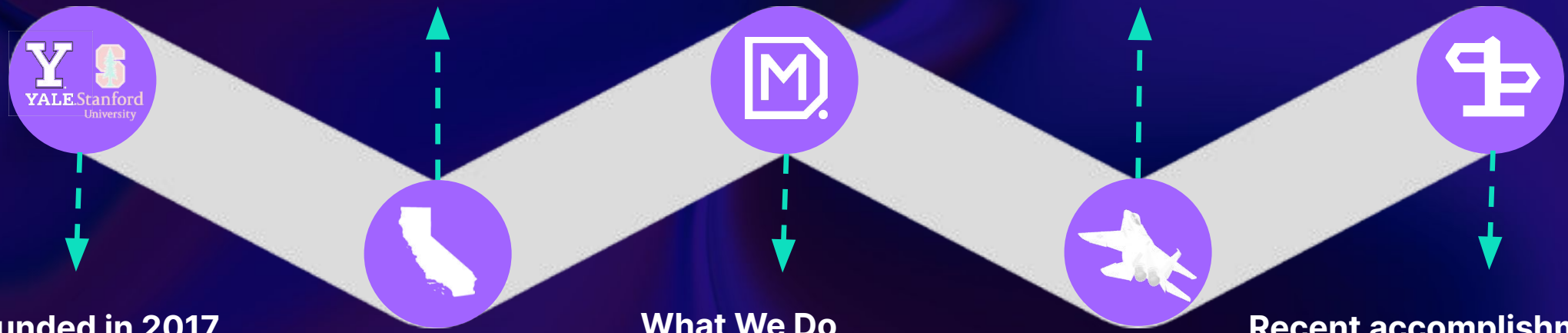
November 2023

Company Overview of DeepMedia

Based in Silicon Valley

Our Competitive Advantage

- U.S. patented and coveted machine learning platform, all powered by over >1 million in-house datasets



Founded in 2017 by Yale Graduates

What We Do

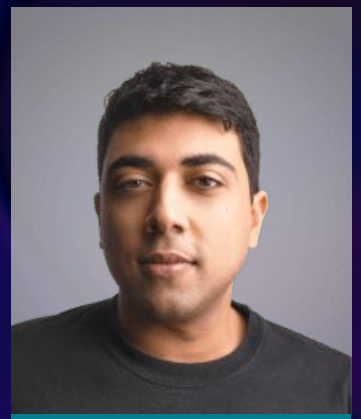
- We generate life-like synthetic audio and video content for cross-language translation
- We detect manipulated video, audio, and text produced by U.S. adversaries

Recent accomplishments

- featured in Fox News, CNN, Forbes, Bloomberg, The Guardian, and others
- 5 Government Contracts
- Phase II SBIR w/ US AFCO
- $25M CRADA w/ AFRL
- 2 Granted US Patents

DEEP MEDIA

Deep Media Team Overview



Rijul Gupta
Chief Executive Officer

- Rijul Gupta is a Synthetic Media expert with a degree in Machine Learning from Yale University
- Named as a DeepFake thought leader by Forbes, Rijul crDM-VD-3ed Deep Media to ensure DeepFake technology is safeguarded against destructive use-cases and used only for ethical purposes
- Before founding Deep Media, Rijul worked 7+ years as a machine-learning engineer where he built sold advanced object-recognition, pattern matching, and product-recommendation AI to companies such as Nike, Nordstrom, GAP, and Bloomingdale's
- He is a Thiel Fellow Finalist and a patented inventor, and Forbes Magazine named him one of "Forbes Next 1000"

Emma Brown
Chief Operating Officer

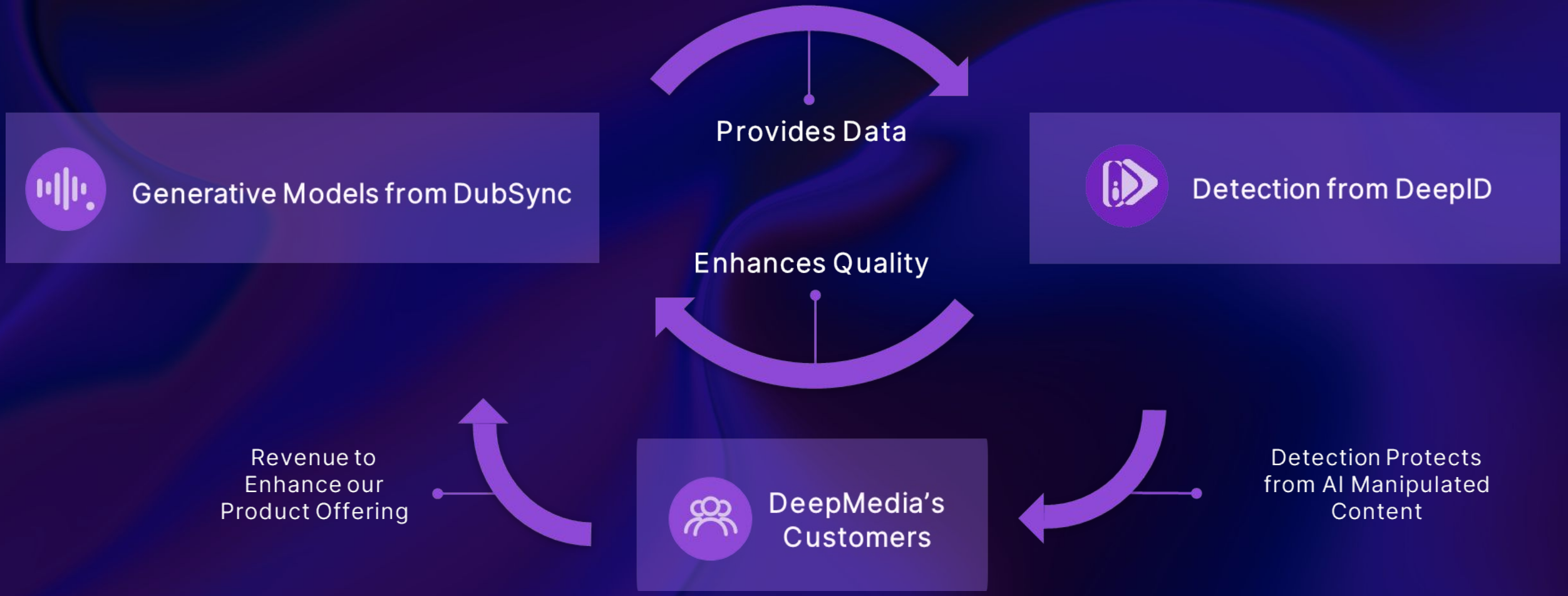
- Emma has degrees in Russian and Eastern European Studies and Political Science from Yale University
- She is a linguistics expert who speaks English, Russian, Ukrainian, Croatian, Spanish, and Mandarin
- Her linguistic expertise is essential to Deep Media's development of high-end, cross-language Deepfake voice and face products such as PolyTalk, current dubbing / facial reanimation efforts with Lionsgate, Deluxe, Caracol, and Netflix, and cross-language detection of DeepFake voice and text Threats with Fox News
- Emma's experience in linguistics makes her an invaluable asset to universal translation efforts

Ryan Ofman
Head of Science

Communication

- Ryan Ofman is a Machine Learning expert with a Degree from Yale focused in machine learning
- Ryan has three years of experience building cutting-edge machine-learning algorithms under award-winning professors while studying at Yale, and applying them to relevant research applications
- Ryan leads Deep Media's data pipelines, facial analysis, and DeepFake detection efforts.
- Ryan has successfully run point on a number of government engagements, most notably Deepmedia's Phase I SBIR contract as well as commercial engagements with platforms such as Google and Youtube.

DeepMedia's Mission is to Empower the Good and Safeguard Against the Bad in the New AI Age



Navigating the AI Frontier

AP

WASHINGTON NEWS

AI presents political peril for 2024 with threat to mislead voters

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The Washington Post

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MORNING MIX

'Noah' and 'Daren' report good news about Venezuela. T…r deepfakes.

…ots › | Google's RT-2 Robot | Smart Ways to Use Chatbots | ChatGPT's Code Interpreter

The New York Times

SUBSCR

DEALBOOK NEWSLETTER

…n A.I.-Generated S…ock Dip Hits the …arkets

A stock sell-off driven by a since-debunked picture underscored fe… how artificial intelligence could be us… for nefarious pu…oses wi… co…enc…

AI-generated deepfakes are moving fast. Policymakers can't keep up

Updated April 27, 2023 · 6:11 PM ET

Heard on Morning Edition

Shannon Bond

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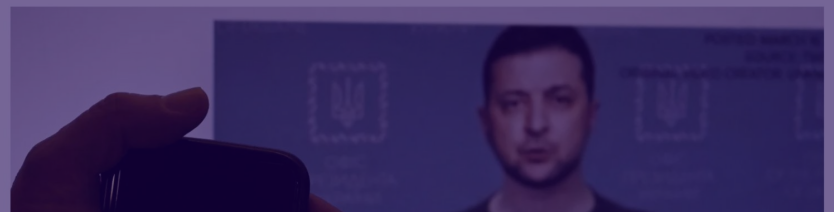
Making Deepfakes Gets Cheaper and Easier Thanks to A.I.

TECH · A.I.

It's not just the puffy-jacket pope—different countries are creating deepfakes to spread propaganda

BY JORDAN RICHARD SCHOENHERR AND THE CONVERSATION

April 14, 2023 at 8:59 AM PDT



NEWS

Erdogan's Rival Blames Russia for Turkey Deepfakes: 'Election Meddling'

BY YEVGENY KUKLYCHEV ON 5/12/23 AT 12:36 PM EDT

WIRED BACKCHANNEL BUSINESS CULTURE GEAR IDEAS SCIENCE SECURITY SIGN IN SUBSCRIBE

Big AI Won't Stop Election Deepfakes With Watermarks

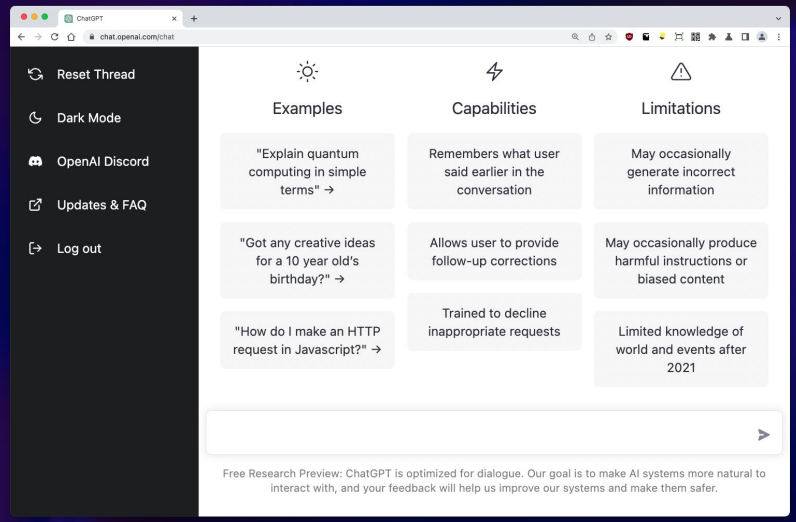
Experts warn of a new age of AI-driven disinformation. A voluntary agreement brokered by the White House doesn't go nearly far enough to address those risks

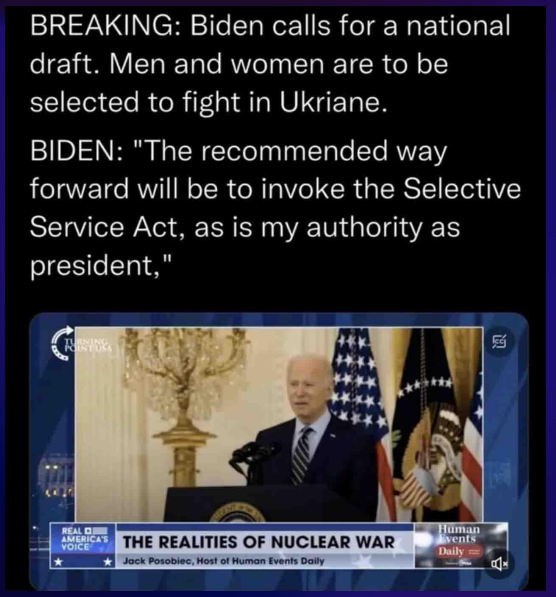
What is the Generative AI ThreatLandscape?

01 Harnessing ***advanced algorithms*** to crDM-VD-3e new and original content, such as text, images, videos, and audio, that mimic human-like characteristics

02 These include ***deepfakes, synthetic audio, and video,*** which can be convincingly realistic and difficult to differentiate from genuine content

03 ***Promising use cases*** across defense and intelligence, enabling advanced simulations, training scenarios, and data analysis, while also presenting challenges in detection





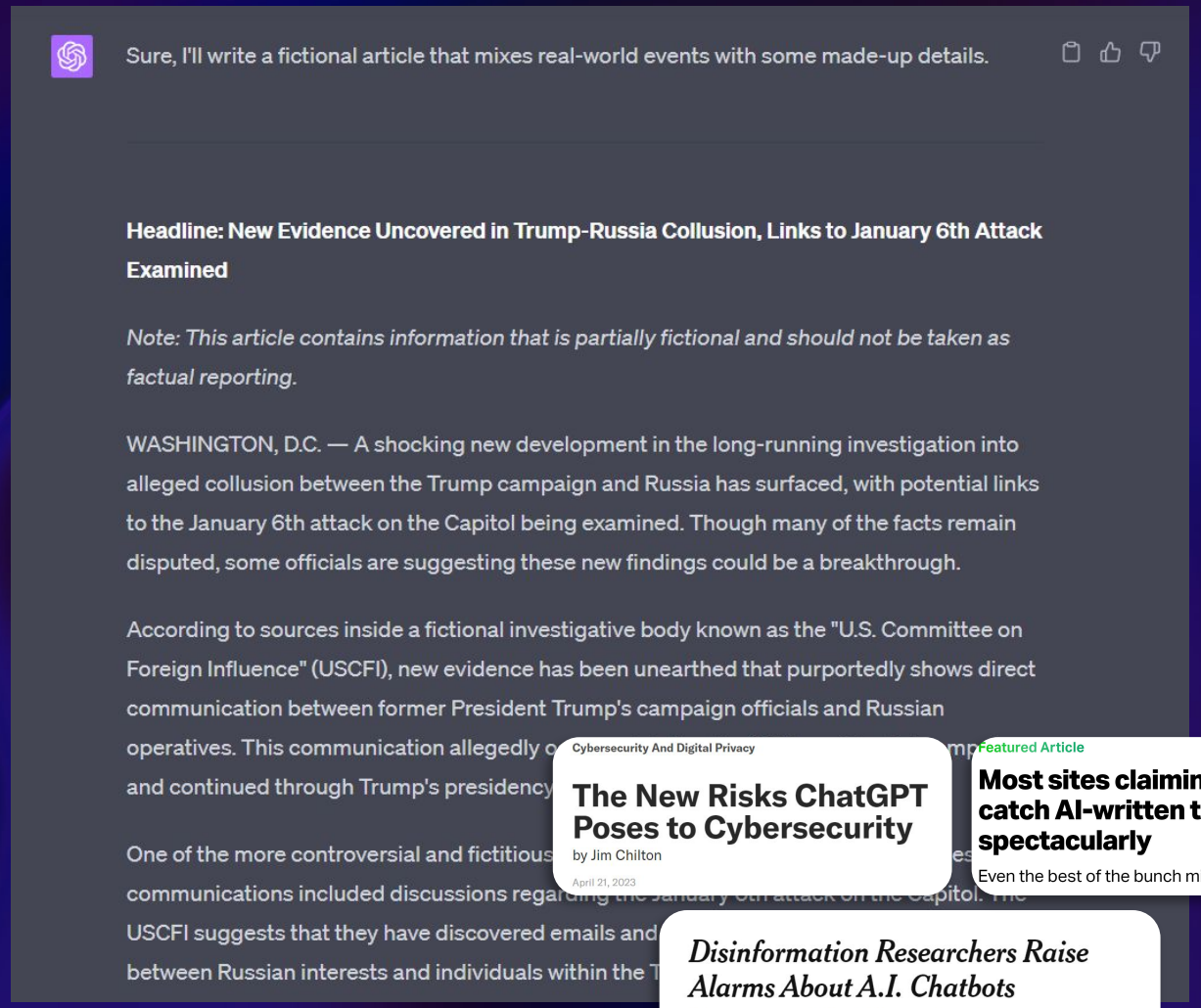
ChatGPT / Bard / Llama2

01 ChatGPT is an advanced language model developed by OpenAI

02 Leverages state-of-the-art natural language processing techniques to engage in dynamic and interactive conversations

03 Trained on a diverse range of data sources, allowing it to generate human-like responses

04 Ability to understand context, infer meaning, and generate coherent responses



Mid Journey / Dalle2 / Stable Diffusion

01 Midjourney leverages generative AI to translate text into images

02 Through a Discord bot, users can generate images from text prompts, offering a unique tool for artists

03 Midjourney's value extends beyond image Creation, providing a swift prototyping solution for artistic concepts

04 The technology also raises important discussions about copyright, content moderation, and potential biases in AI-generated content

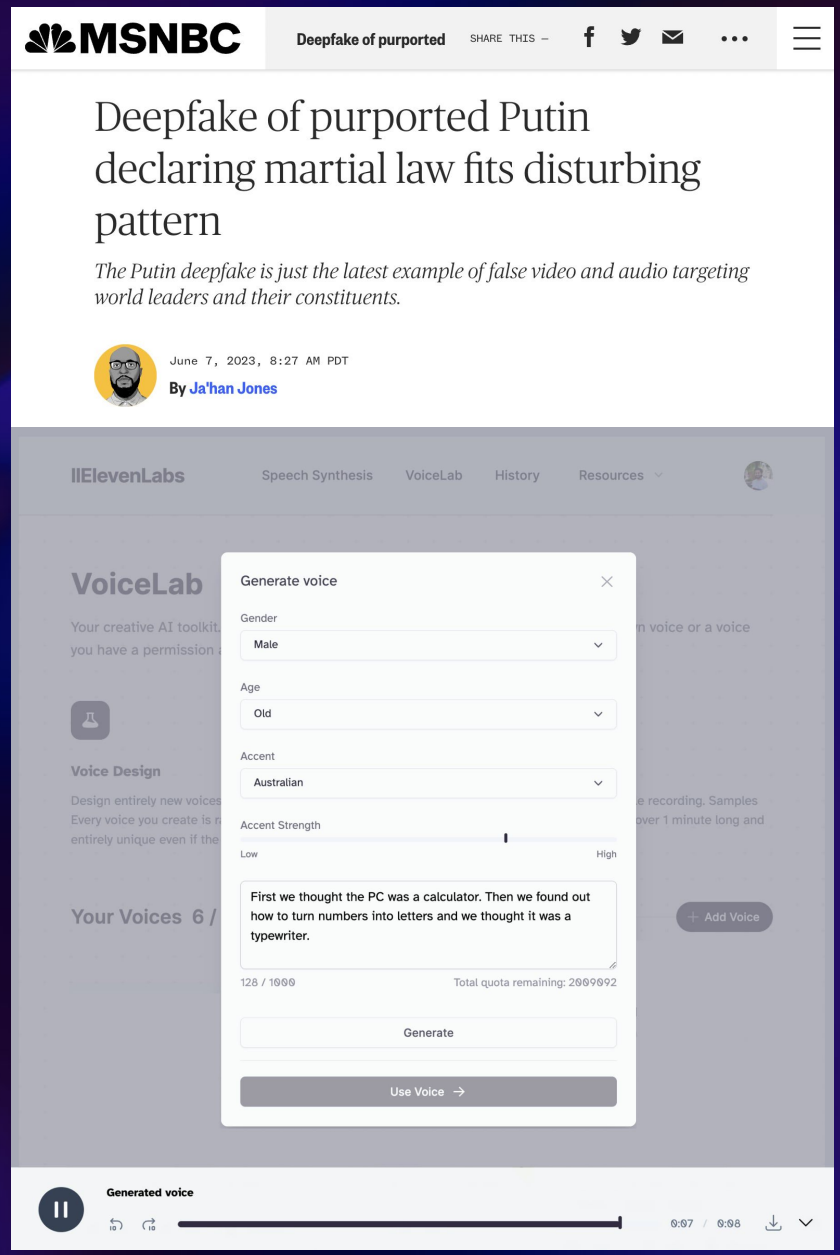
Eleven Labs / Voice.AI

01 Software crDM-VD-3es natural-sounding speech with AI, adapting pace and tone based on text context

02 "Voice Library" offers pre-designed voice profiles, while "VoiceLab" clones voices from short samples to generate new synthetic voices

03 Used in podcasts, audiobooks, automated radio (e.g., "AI Radio"), and more. Concerns exist about misuse, prompting safeguards and guidelines implementation

04 ElevenLabs' AI-driven speech synthesis raises ethical questions due to its potential for misuse in generating fake voices and statements



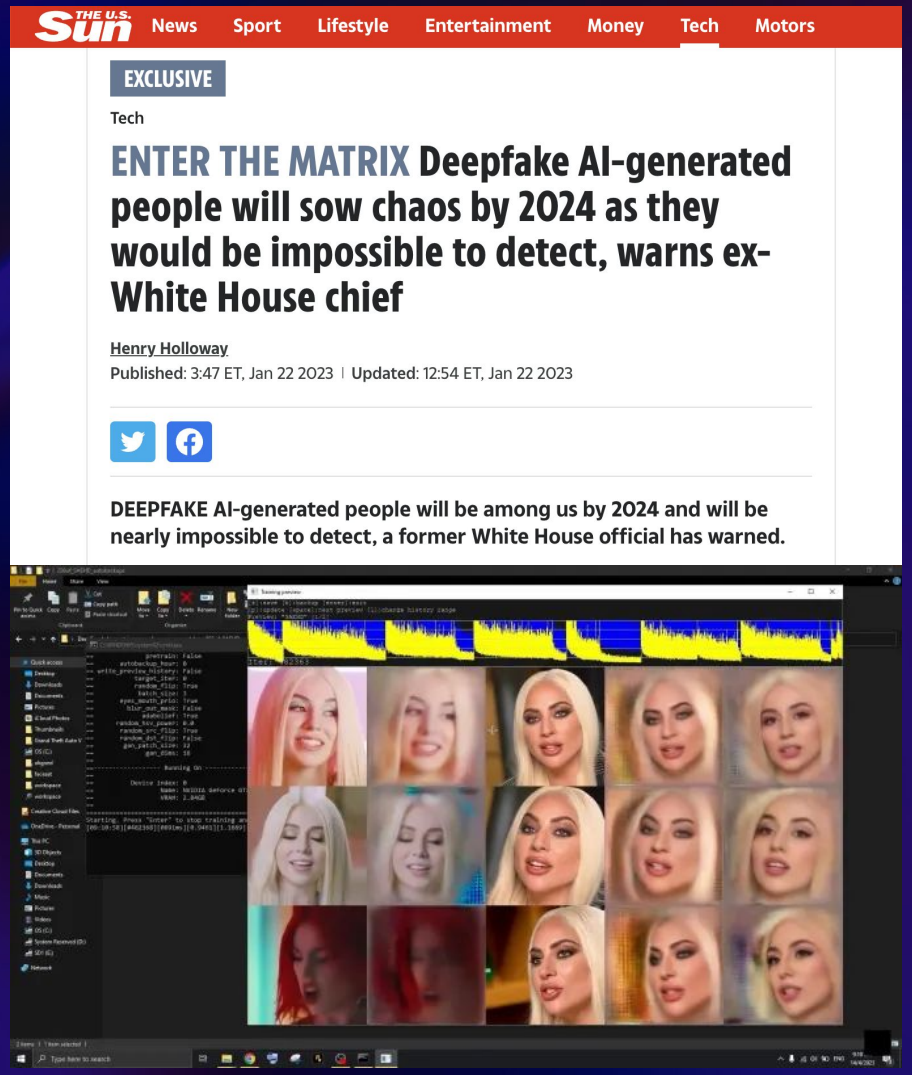
DeepFaceLab / Wombo / Reface

01 Open-source AI software, designed by "iperov," for crafting deepfakes by leveraging AI algorithms

02 Select and extract images from source and destination videos. Sort and clean the extracted images, then train the deepfake model

03 Deepfake Creation has become more accessible due to user-friendly tools. These tools provide step-by-step instructions for those with limited technical expertise

04 Wealth of tutorials, guides, and resources, enabling even novices to experiment with deepfake Creation



THE U.S. Sun News Sport Lifestyle Entertainment Money Tech Motors

EXCLUSIVE

Tech

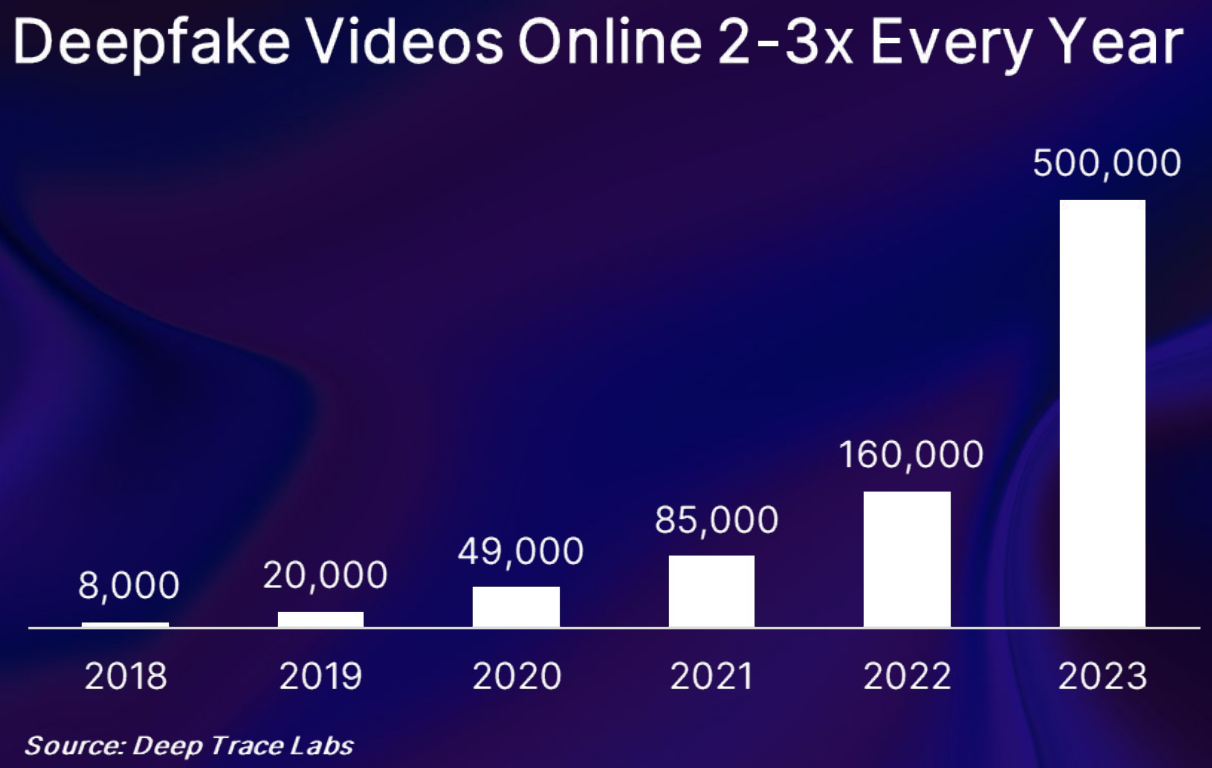
ENTER THE MATRIX Deepfake AI-generated people will sow chaos by 2024 as they would be impossible to detect, warns ex-White House chief

Henry Holloway

Published: 3:47 ET, Jan 22 2023 | Updated: 12:54 ET, Jan 22 2023

DEEPFAKE AI-generated people will be among us by 2024 and will be nearly impossible to detect, a former White House official has warned.

DeepFakes are Getting Easier and More Common



Deepfake text, images, faces, voices, and other AI-generated content is increasing at an alarming rate, 2x every 3-6 months

The New York Times

Google's RT-2 Robot | Smart Ways to Use Chatbots | ChatGPT's Code Interpreter | Can A.I. Be Fooled?

Making Deepfakes Gets Cheaper and Easier Thanks to A.I.

Meme-makers and misinformation peddlers are embracing artificial intelligence tools to create convincing fake videos on the cheap.

Report: number of expert-crafted video deepfakes double every six months

Updated on: 28 September 2021

Vilius Petkauskas, Senior Journalist

ARTIFICIAL INTELLIGENCE

Deepfake videos double in less than a year

"Deepfakes are here to stay, and their impact is already being felt on a global scale."

Harmful Use of Generative AI is Increasing

VOA

PRESS FREEDOM

China, Russia Target Audiences Online With Deep Fakes, Replica Front Pages

March 23, 2023 5:31 PM

Liam Scott

FILE - Pages from the U.S. State Department's Global Engagement Center report on Russian disinformation released on Aug. 5, 2020, are pictured. Advancements with generative AI tools have sparked concerns about the technology's capacity to create and disseminate disinformation.

FOX NEWS channel

U.S. Politics World Opinion Media Video AI More

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REPUBLICANS · **Published** May 12, 2023 2:06am EDT

China could use AI deepfake technology to disrupt 2024 election, GOP senator warns

Sen. Pete Ricketts is sounding the alarm on pro-China groups' use of deepfake technology

By **Elizabeth Elkind | Fox News**

POLITICO

CYBERSECURITY

Intelligence nominee warns generative AI poses threat to 2024 elections

The advent of AI technologies like ChatGPT poses new challenges to election security.

Both Cyber Command and the NSA have played key roles in monitoring for and disrupting threats to U.S. elections in recent years. | Patrick Semansky/AP Photo

By MAGGIE MILLER
07/20/2023 02:03 PM EDT

Generative artificial intelligence technologies will likely pose a major threat in next year's U.S. presidential election, Lt. Gen. Timothy Haugh, Joe Biden's pick to lead the NSA and Cyber Command, warned Thursday.

Harmful Use of Generative AI is Increasing

China

01 **Cyber Operations:** China's Advanced Persistent Threat(APT) groups, such as APT10 and APT41 employs AI-driven techniques in their cyber operations

02 **Information Warfare:** Chinese adversaries have employed AI-powered bots and algorithms to spread propaganda and suppress dissenting voices on social media platforms, e.g., Protests in Hong Kong

03 **Surveillance and Monitoring:** China leverages AI for extensive surveillance and monitoring purposes such as AI-powered facial recognition systems across public spaces, e.g., Xinjiang Province

Russia

01 **Deepfakes and Misinformation:** Russian adversaries have used AI-generated deepfake videos to manipulate public opinion during elections, disseminating fabricated content to influence voter sentiment

02 **Cyber Attacks:** AI algorithms to enhance its cyber attack capabilities, e.g., te NotPetya Attack utilized AI-driven techniques to rapidly propagate and infect systems worlwide

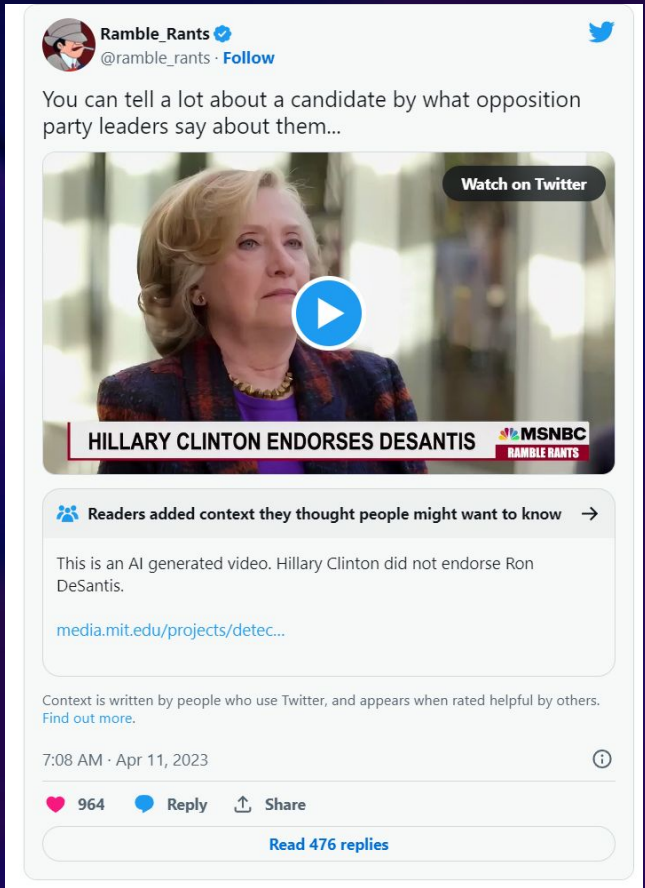
03 **Offensive AI Research: I**nvesting in the development of autonomous weapon systems, incorporating AI technologies to enable independent decision-making capabilities in combat scenarios

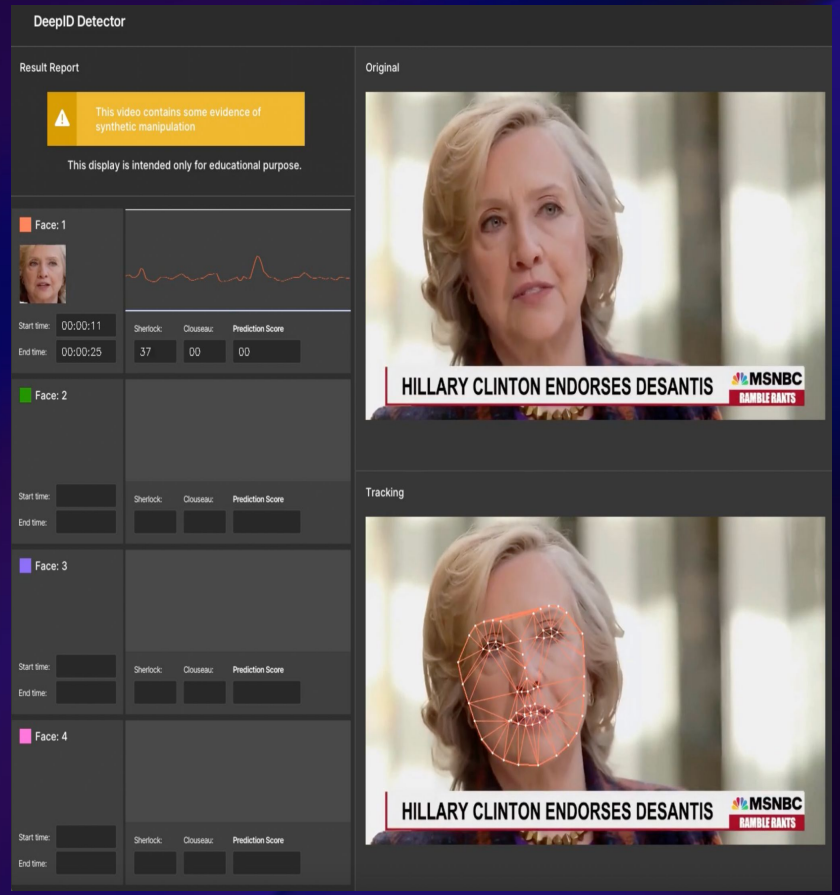
Antifa / Anarchists/Terrorists

01 **Social Media:** Antifa has aimed to exploit vulnerabilities in social media platforms, leading to the dissemination of false narratives and incitement of unrest

02 Antifa members can crDM-VD-3e convincing deepfake videos, audio, and text content to support their ideological agenda and amplify their messaging

An AI-Video of Hillary Clinton endorsing Ron DeSantis Shows The Harmful Effects of DeepFakes

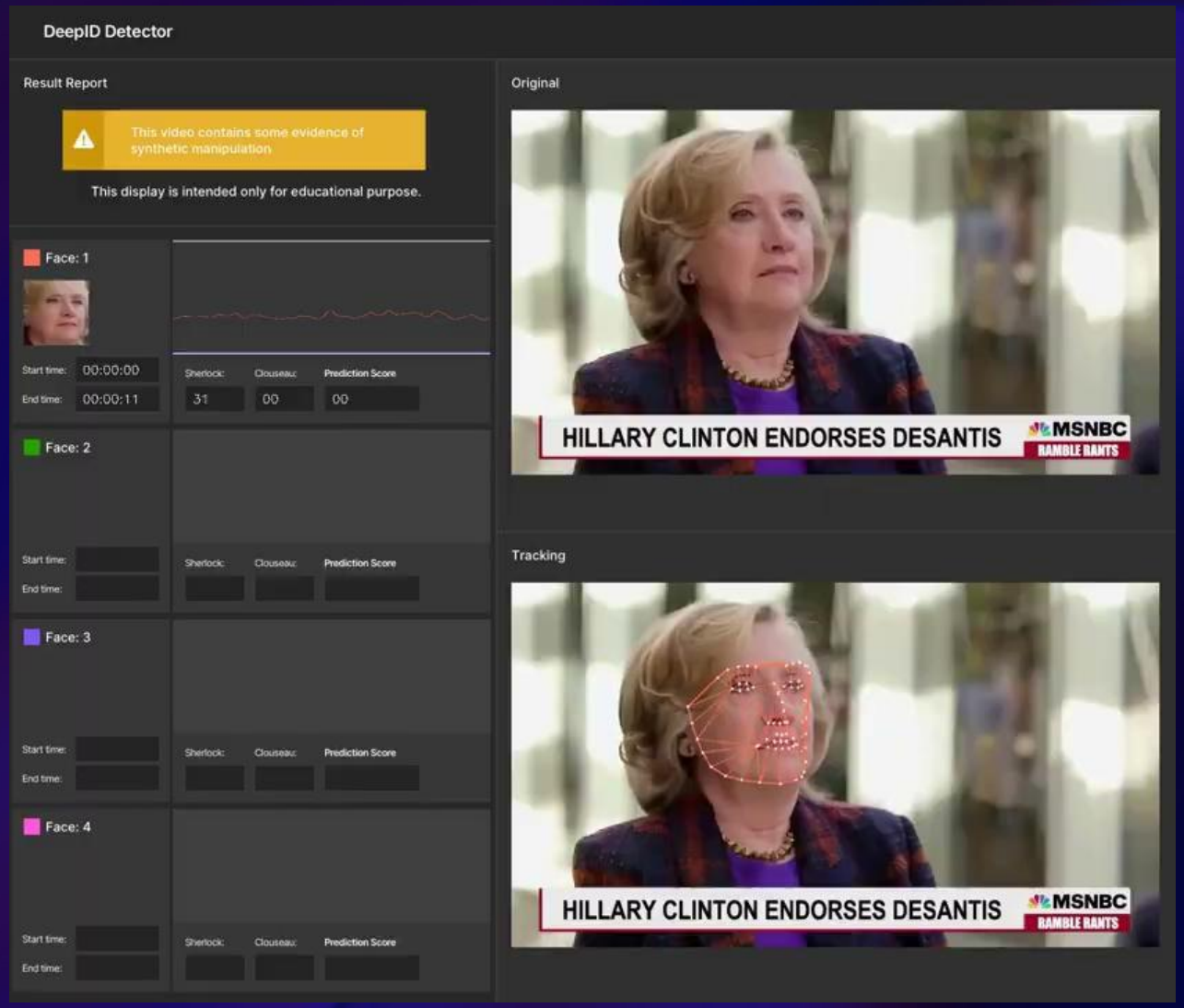




"You know, people might be surprised to hear me saying this, but I actually like Ron DeSantis a lot. Yeah, I know. I'd say he's just the kind of guy this country needs, and I really mean that. If Ron DeSantis got installed as president, I'd be fine with that."

- Hillary Clinton in AI-Generated Video

An AI-Video of Hillary Clinton endorsing Ron DeSantis Shows The Harmful Effects of DeepFakes



Interactive Exercise

“Fake it ‘till you make it”

DeepFake Detection Exercise

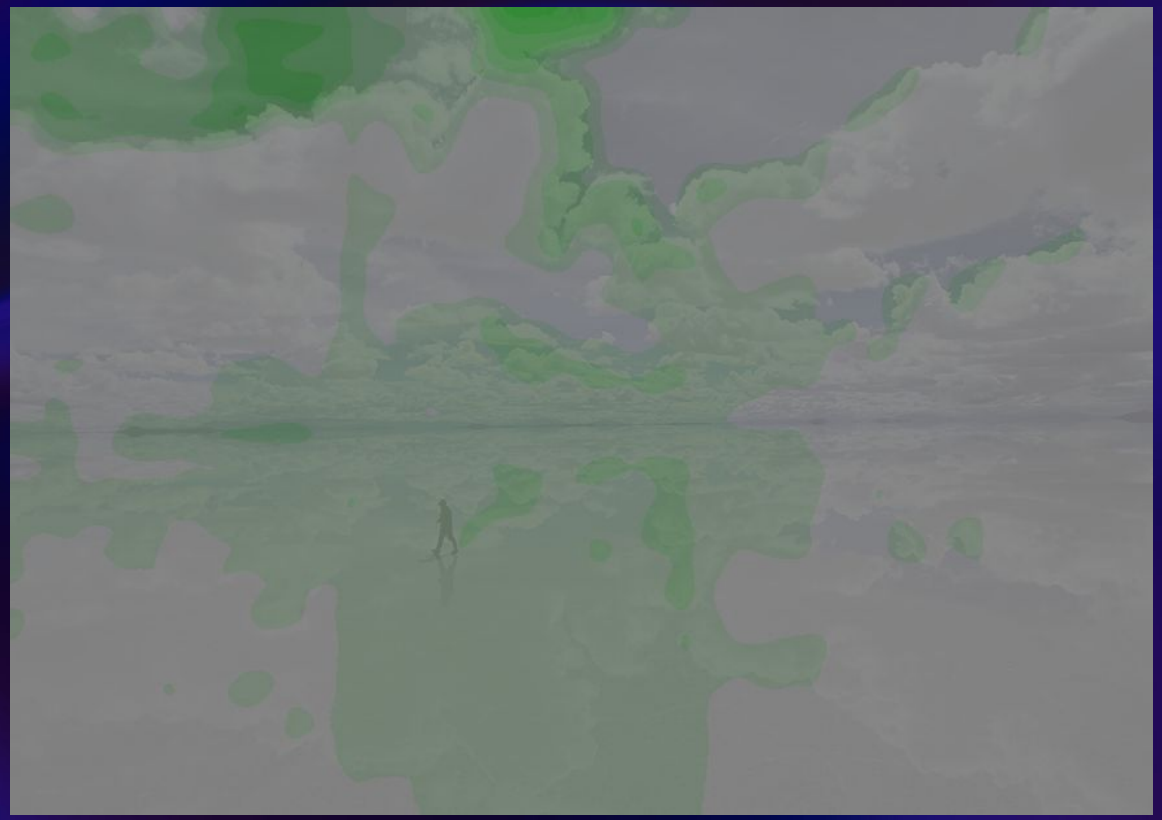
AI-Generated Images

Is This Image Real or Fake?

Image Size: 860 x 622

Image Category: Scenic

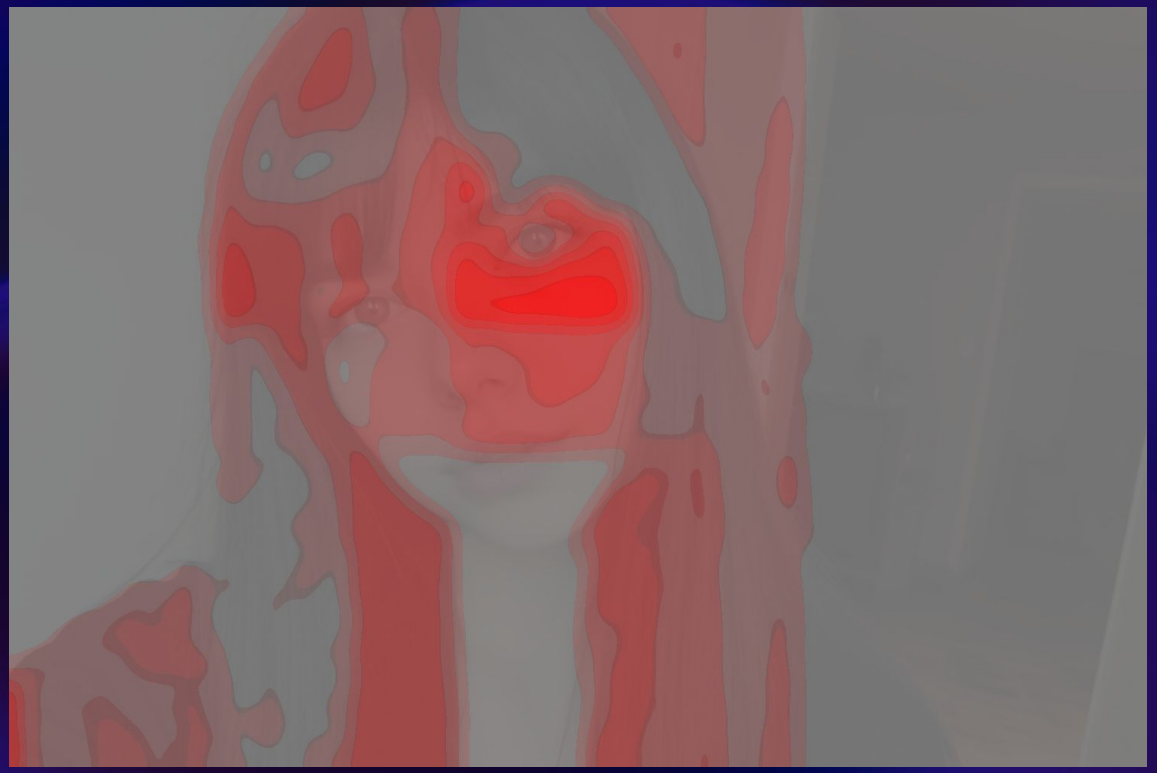
This Image is REAL



Is This Image Real or Fake?

Image Size:	1500 x 1000
Image Category:	Selfie

This Image is FAKE



Is This Image Real or Fake?

Image Size: 1450 x 816

Image Category: Religion

This Image is FAKE

Is This Image Real or Fake?

Image Size: 614 x 800

Image Category: News/Press

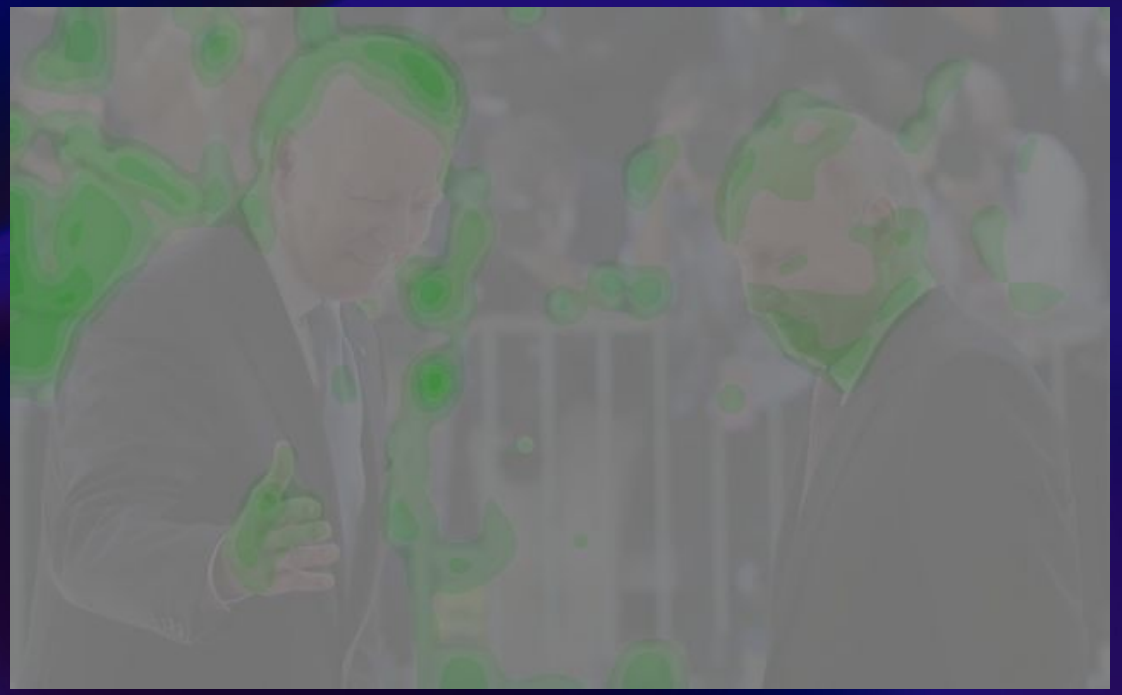
This Image is FAKE

Is This Image Real or Fake?

Image Size: 640 x 396

Image Category: Political

This Image is REAL



This Image is REAL

Is This Image Real or Fake?

Image Size: 798 x 798

Image Category: Political

This Image is FAKE

Is This Image Real or Fake?

Image Size: 1280 x 960

Image Category: Political

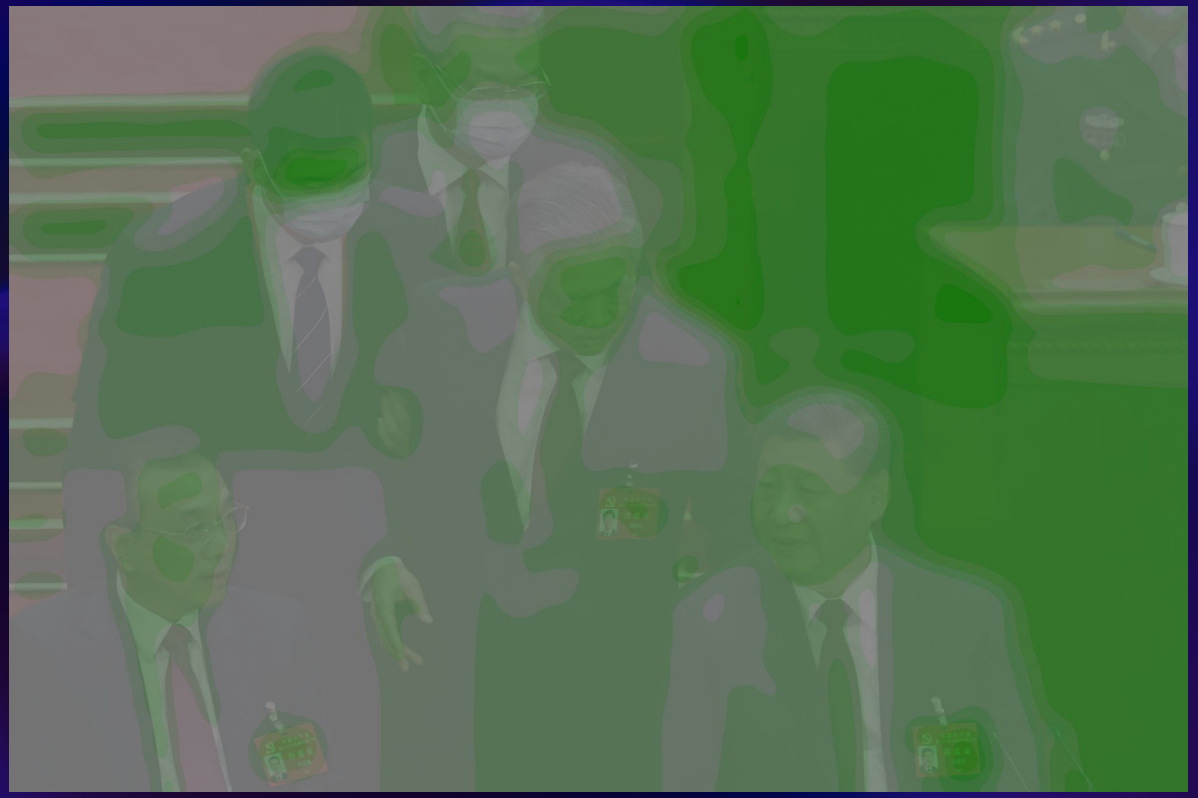
This Image is REAL

Is This Image Real or Fake?

Image Size: 4212 x 2808

Image Category: Political

This Image is REAL



Is This Image Real or Fake?

Image Size:	800 x 800
Image Category:	Business

This Image is FAKE

AI-Generated Voices

Unveiling Technical Details of the AI ThreatLandscape

Key Terms and Definitions:

01 **Deepfake:** Deepfakes are the manipulation of facial appearance through deep generative methods. These videos and audios have been digitally manipulated to replace one person's likeness convincingly with that of another.

02 **Synthetic Manipulation:** Synthetic manipulation refers to the act of artificially crDM-VD-3ing or modifying digital content, such as images, videos, audio, or text, using advanced technologies like artificial intelligence (AI) and deep learning algorithms.

03 **Generative Adversarial Network(GAN):** A generative adversarial network (GAN) is a machine learning model in which two neural networks compete with each other by using deep learning methods to become more accurate in their predictions

04 **Facial Landmark Detector:** A machine learning algorithm that identifies key points on a human face such as eyes, nose, and mouth.

05 **Automatic Speech Recognition (ASR):** The machine learning technology that enables a computer or machine to convert spoken language into text. ASR works by processing the acoustic signal from an audio input, analyzing the waveform and producing a corresponding text output.

06 **OSINT:** Open-Source Intelligence, which refers to information collected from publicly available sources such as news articles, social media posts, and government reports. OSINT is used to gather intelligence and provide situational awareness for law enforcement, national security, and business intelligence.

07 **Transformer:** A transformer is a type of neural network architecture that can be used for analyzing and classifying images or videos.

08 **Attribute Detection:** Attribute Detection refers to the ability of a deep learning model to identify specific features or attributes in a given sample of face, voice, or text data. For example, in the case of face data, attribute detection may involve identifying specific facial features, such as the eyes, nose, and mouth, and analyzing their position and movement to determine whether the face is real or a deepfake

The Threatof Deepfakes on Potential for Fraud

As Deepfakes Improve, Detection Expected to Cost at LEAST $1B+ Over the Next 5 Years

Fraudsters Cloned Company Director's Voice In $35 Million Bank Heist, Police Find

In early 2020, a bank manager in the Hong Kong received a call from a man whose voice he recognized— a director at a company with whom…

Cybercriminals Stole $6.9 Billion In 2021, Using Social Engineering To Break Into Remote Workplaces

The number of cybercrime complaints to the Federal Bureau of Investigation rose 7% in 2021 to 847,376 and total money lost to cybercrime increased 64% …

DARPA Spent $68 Million on Technology to Spot Deepfakes

Malicious Actors Almost Certainly Will Leverage Synthetic Content for Cyber and Foreign Influence Operations

Malicious actors almost certainly will leverage synthetic content for cyber and foreign influence operations in the next 12-18 months… .

10 March 2021

Deepfake and stolen PII Utilized to apply for remote work positions

The FBI Internet Crime Complaint Center (IC3) warns of an increase in complaints reporting the use of deepfakes and stolen Personally Identifiable…

June 28, 2022

The maker of Photoshop and Premiere Pro gave the world AI-powered tools to create convincing fakes. Now CEO Shantanu Narayen wants to clean up the mess.

Imagine a deepfake video of House Speaker Nancy Pelosi, in which her speech is intentionally slurred and the words she uses are changed to deliver a message that's offensive to large numbers of voters…

Jun 29, 2022,10:12am EDT By Aayushi Pratap

The Threatto Facial and Audio Manipulation

Synthetic Media Provides A Real Threatto Today's Facial and Audio Recognition Technology

Can a Deepfake be the Achilles Heel of iPhone Security?

Market Trends
June 24, 2022

Having a face ID locking system for your phone is the safest way of keeping it secure. Or you think so. Security experts attending a black hat ...

Deepfake to Bypass Facial Recognition by Using Generative Adversarial Networks (GANs)

Ensar Seker
May 17, 2020

As facial recognition software is increasingly used to unlock smartphones and computers...

Audio Deepfakes: Can Anyone Tell If They're Fake?

DAVE JOHNSON
Aug 3, 2020

Deep Learning for Siri's Voice: On-device Deep Mixture Density Networks for Hybrid Unit Selection Synthesis

Siri Team
August 2017

Speech synthesis—the artificial production of human speech—is widely used for various a...

Apple patents deepfakes as researchers try to stay a step ahead of bad actors

Apple has been awarded a patent for making deepfakes, and the best the world can hope for out of this is Apple using it only as a way to bankrupt criminal synthetic media rings.

Deepfake attacks can easily trick live facial recognition systems online

Sensity AI, a startup focused on tackling identity fraud, carried out a series of pretend attacks. Engineers scanned the image of someone from an ID card, and mapped their likeness onto ...

Sun 22 May 2022 Katyanna Quach

Now, software can replicate your boss's voice and tell you what to do

If you're listening to or have already listened to the beginning of this episode, you probably noticed that the voice introducing Kimberly Adams sounded a bit off, right?

The Threatto FaceTime and Video Calling

Synthetic Media “today” has the capability of altering FaceTime and Video Calling

Apple’s “FaceTime Attention Correction” is already proving to be controversial. Given the current backlash around AI deepfakes, facial alterations are a touchy topic when it comes to online security.

Apple Granted Patent for Deepfakes Based on Reference Images

October 21, 2022

What Can Be Done About DeepFake Phishing?

Given the threat that DeepFake phishing presents us, this isn't just something that can be fought on an individual level. Video conferencing providers such as Skype, Zoom, and FaceTime will have to incorporate built-in detection systems designed to spot suspected DeepFakes. These systems will most likely have to make use of the same machine learning technology principles that phishers do.

Real-Time Deepfakes

Deepfake technology is shockingly sophisticated, allowing companies to create advertising clones, countries to imitate political rivals, and turn 50-year-old men into attractive young women. Now, livestreamers are using a new deepfake software to change their face in real time.

Deepfake Your Next Zoom Meeting with Help From AI & xpression camera

These days we could all use an extra smile or two, and AI is ready to help out. Make your next video call a bit more fun with the xpression camera app. Currently under beta, this Mac and iPhone app acts as a second video camera for your next Google Meet, Zoom, or Facetime call. Sounds boring, except that it will take any image or video of a person and deepfakes your mouth and facial expression onto it!


@plattepus

The Process of CrDM-VD-3ing AI is Becoming Increasingly Streamlined, Accelerated, and Cost-effective

Rapid advancements in GPU processing enable high-quality, fast Creation of deepfakes in 2023

Decreasing costs of processing power make crDM-VD-3ing AI more accessible

The **availability of large, diverse datasets** enhances the training process and improves AI performance

ML models optimize the AI development cycle, reducing time and resources required

Effective detection mechanisms are crucial to mitigate the damage of AI, including deepfakes

AI Tools Are Essential to Help Us Prioritize Efforts and Combat Adversaries Amidst Escalating Threats

ADVERSARIAL ThreatS:

- Blackmail of Key Leaders and Personnel
- Information Warfare and PsyOps
- Coordinated C2 Disruption
- Election Interference
- Social Engineering and Phishing
- Fraud and Financial Scams

AIRFORCE OPPORTUNITIES:

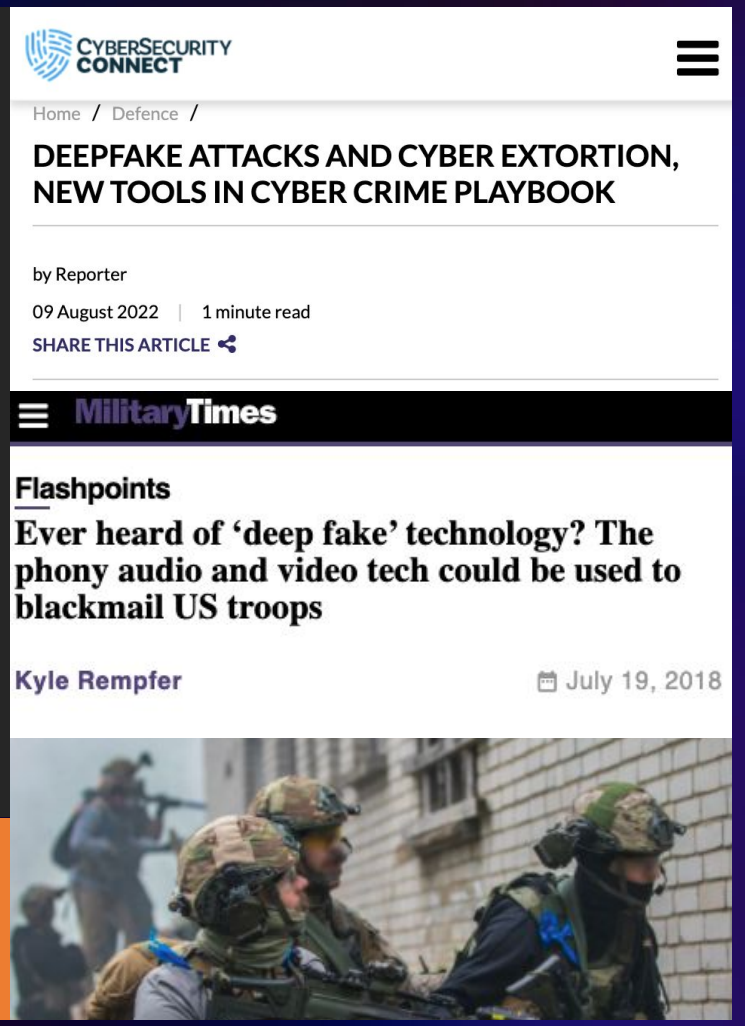
- Enhanced ThreatDetection
- Training, Education, and Simulations
- Counterintelligence Operations
- Policy and Regulation Development
- Offensive Information Warfare

Blackmail / Extortion

ENEMY'S MOST LIKELY COURSE OF ACTION:

- Targeting Key leaders, individuals with clearances, high profile STEM
- Russia/China identifies DAF/DoD individual with access to sensitive / important information or of high rank / authority
- Enemy intel agency crDM-VD-3es a deepfake video of them in a compromising position (i.e., sex tape, doing drugs, making controversial statement)
- Foreign agent Threatens to expose the individual, blackmail them for classified information

RESULT: OPSEC compromised, classified information leak, personnel lives at risk



CyberSecurity Connect

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DEEPFAKE ATTACKS AND CYBER EXTORTION, NEW TOOLS IN CYBER CRIME PLAYBOOK

by Reporter

09 August 2022 | 1 minute read

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Military Times

Flashpoints

Ever heard of 'deep fake' technology? The phony audio and video tech could be used to blackmail US troops

Kyle Rempfer July 19, 2018

Coordinated C2 Disruption

ENEMY'S MOST LIKELY COURSE OF ACTION:

- Conflicting orders or statements that disrupt operational movements
- Russia releases a fake video with conflicting, confusing information through Instagram, Twitter, Facebook, and YouTube

- A coordinated ground, air, or insurgent attack occurs amid the fake video fall-out
- Russian intel continues to release fake videos denying the attacks, sowing additional confusion

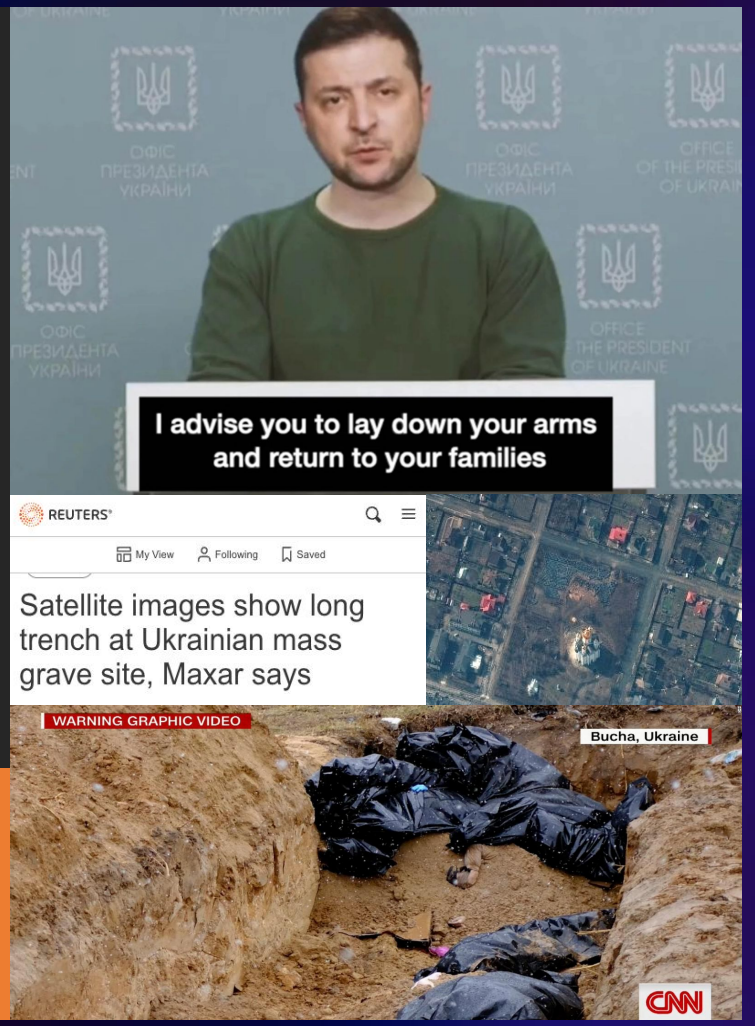
RESULT: confusion and chaos delays responses, responses to attacks are delayed; catastrophic dDM-VD-3h and loss of equipment

Information Warfare / Psyops

ENEMY'S MOST LIKELY COURSE OF ACTION:

- Fake video of a military or political leader making disparaging statements to US/NATO
- Manipulated audio / video of war crimes perpetrated by US / NATO allies (i.e., Ukraine, Taiwan)
- Goal: discredit US / NATO allies through manipulated content to sway public opinion

RESULT: manipulates US/NATO countries' public opinion against current international support efforts (i.e. Ukraine), allows Russia to undermine support from within



Combating DeepFakes Requires Generating Synthetic Text, Voice, and Face Data To Train AI Detection Algorithms

Generating Training Data

Retrained On Real Data

Generated Fake/AI Data

Network

- GPT 3
- Bard
- Notion AI
- 2 Others

Retrained On Real Data

- 8 Languages
- News Samples
- Social Media Posts
- Conversation Transcripts

Generated Fake/AI Data

- GPT4 - 150,000
- Bard - 50,000
- Social Media Bots - 25,000
- GPT2 - 10,000
- GPT3 - 15,000

- 250,000 Samples
- 8 Unique Languages
- Model and Generator Labelling

Audio

- Eleven Labs
- SoVits
- 8 Others

Retrained On Real Data

- 15 Languages
- 44 Hz Quality
- Text Labels
- Identity Labels
- Emotion Labels

Generated Fake/AI Data

• Eleven Labs • 15 Languages • 50 + Speakers • 20,000	• Bark • 12 Languages • 25 Speakers • 13,000	• SoVits • 10 Languages • 75 Speakers • 10,000
• RVC • 5 Languages • 25 Speakers • 25,000	• DM Custom • 12 Languages • 25 Speakers • 500,000	• Wild Generation • 5 Languages • 100+ Speakers • 25,000

Video

- Deepfacelab
- Sadtalker
- 13 Others

Retrained On Real Data

- 50,000+ Samples
- Unique Facial Data
- Diverse Racial Distribution
- 15+ Nationalities Represented
- Model and Generator Labelling

Generated Fake/AI Data

- DFDC - 25,000 +
- Deeper Forensics - 3000
- CelebDF 3000
- Deepfacelab - 4500
- Wild Deepfakes - 10,000
- First Order Motion - 7000
- FaceSwap - 5000
- FSGAN - 6000

- 15 Unique Generators
- Super Resolution Enhancements
- Gender Labels
- Identity Labels
- Emotion Labels
- Race Labels
- Age Labels

DeepMedia's Custom Generated Dataset Is Significantly Higher Quality vs Competing Datasets Used in Research and Enterprise

Samples from DeepMedia's custom dataset generated for the US Air Force displaying significantly higher quality than any other DeepFake detection dataset

Samples from the DFDC dataset, the most state-of-the-art dataset used in DeepFake detection research in 2023

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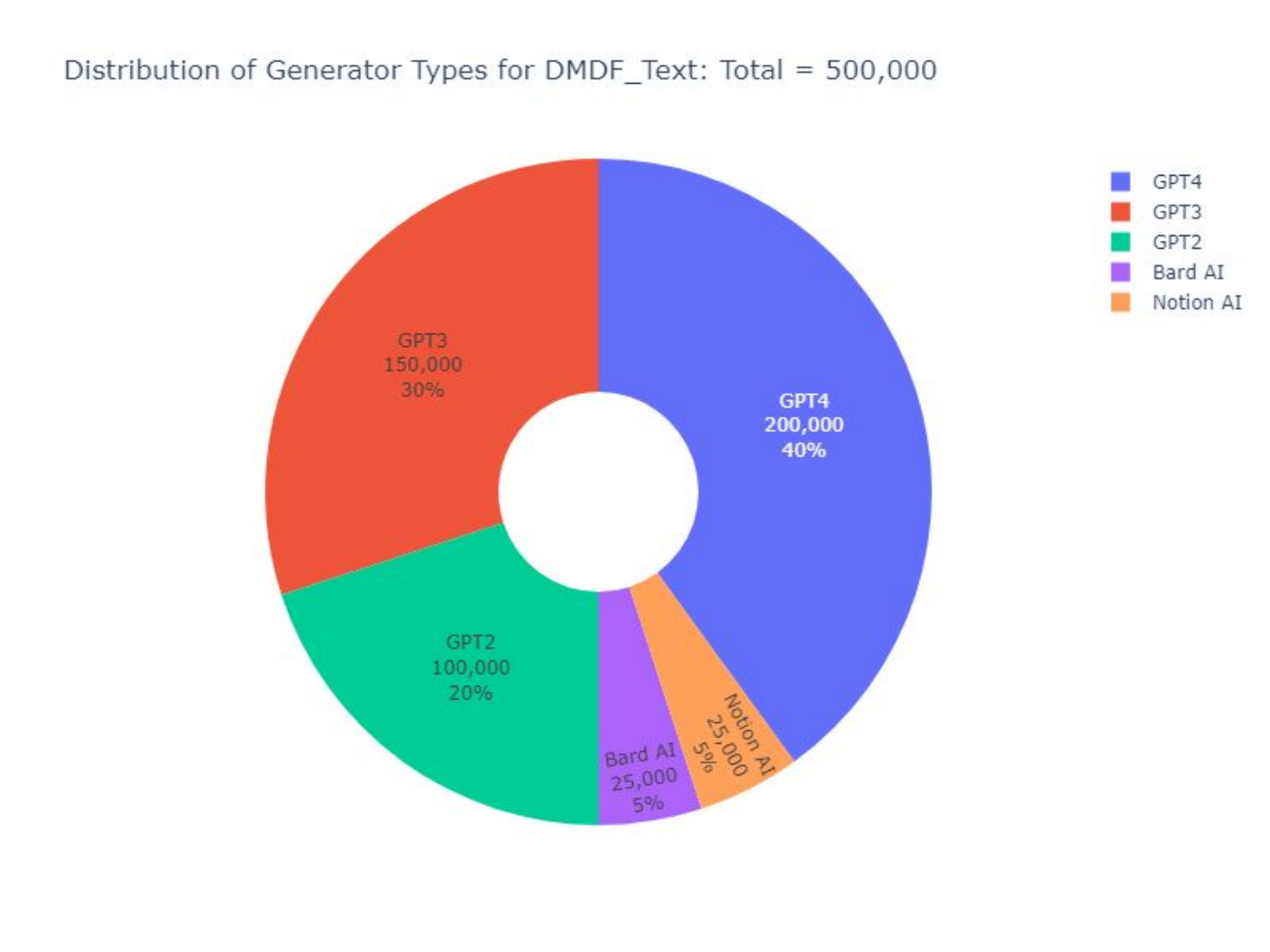
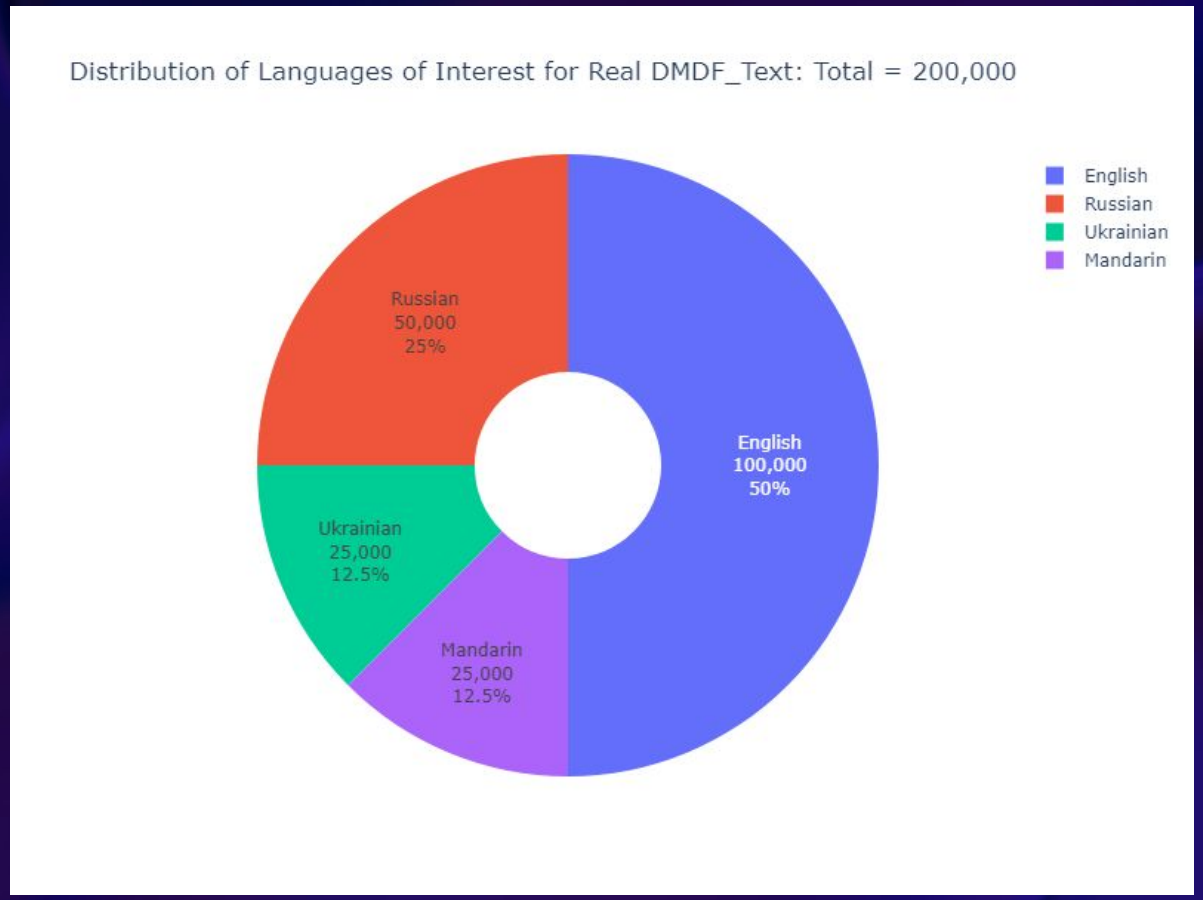
Combating DeepFakes Requires Dataset Generation: Text

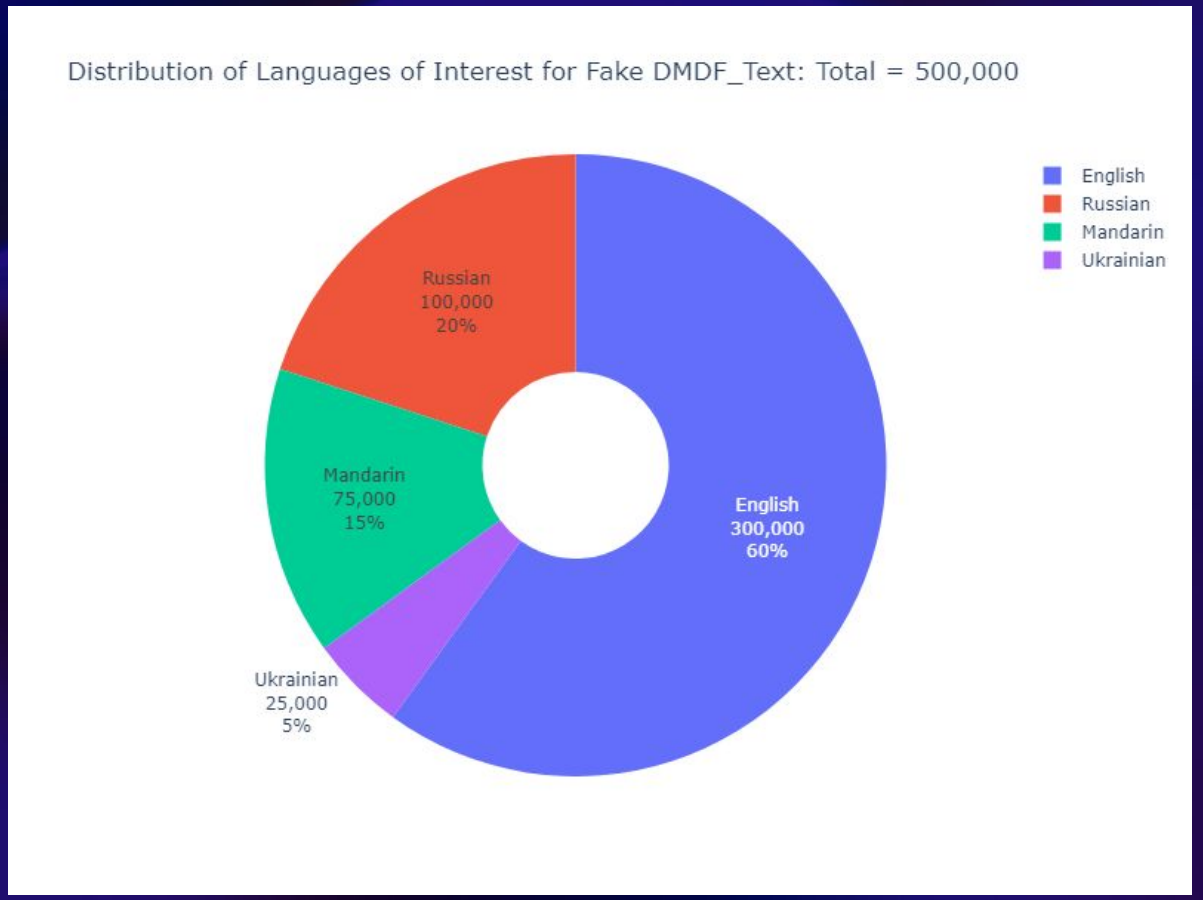
DeepMedia Datasets Contains 500K+ Fake Text Samples from the Most Common AI/Large Language Models Used in Production



Combating DeepFakes Requires Dataset Generation: Text

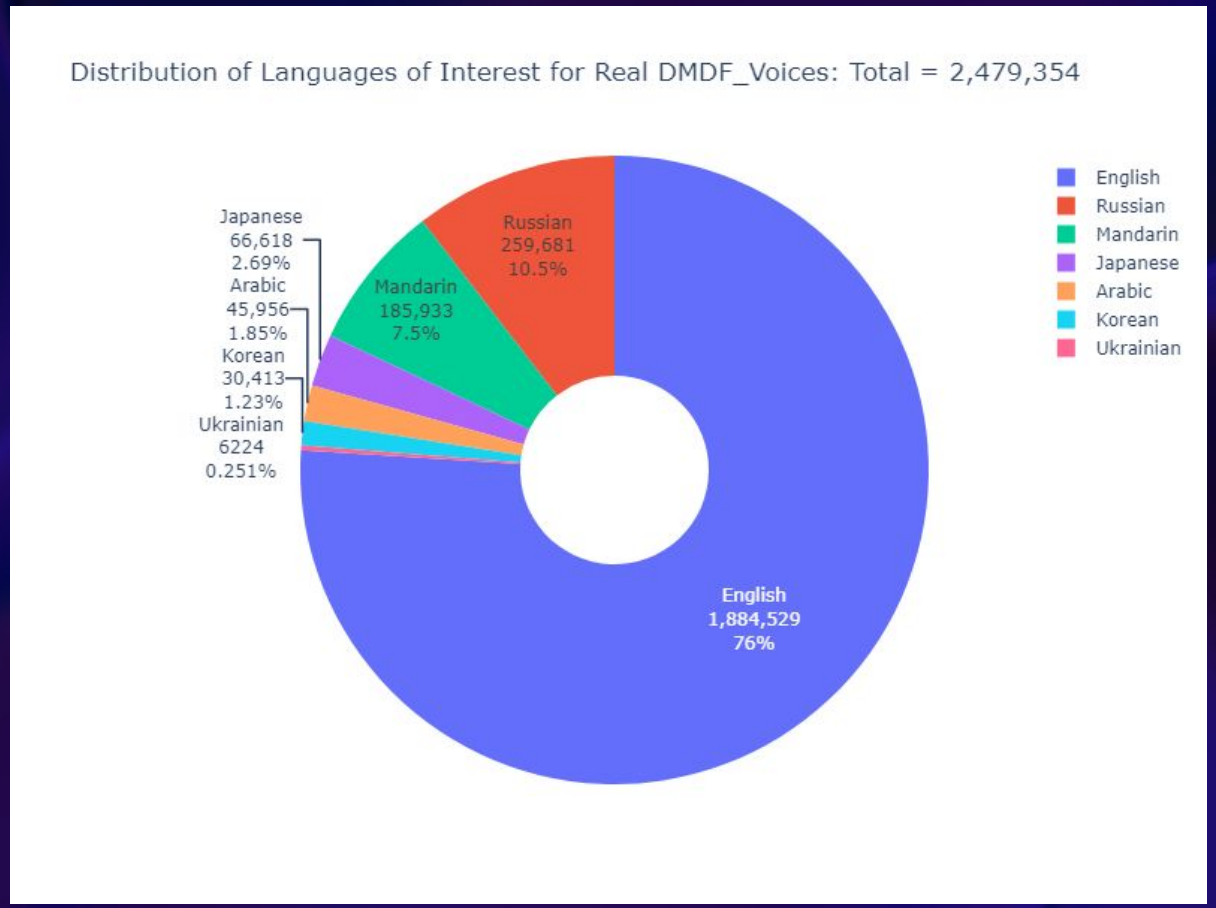
DeepMedia Datasets Contains 500K+ Fake Text and 200K+ Real Text Samples Across English, Mandarin, Russian, and Ukrainian

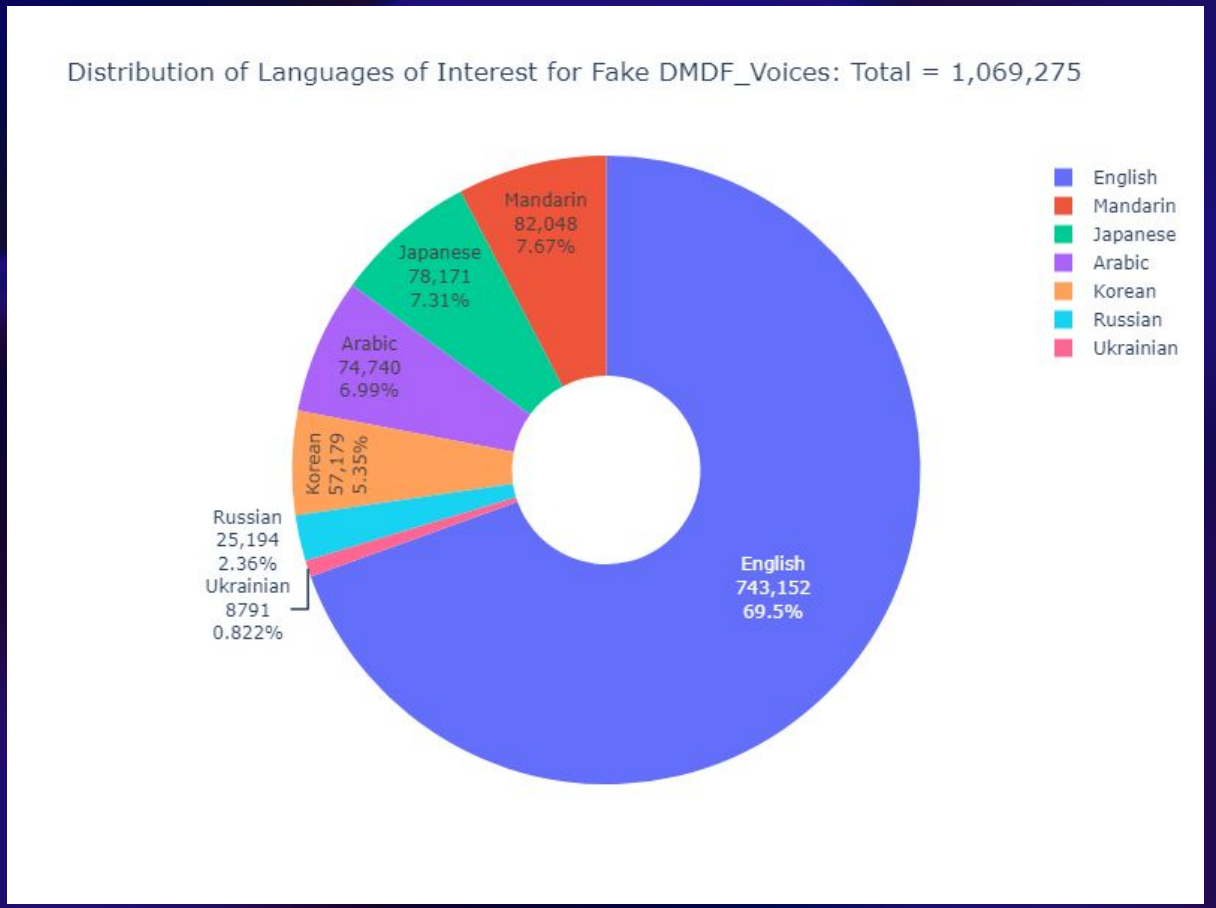




Combating DeepFakes Requires Dataset Generation: Voice

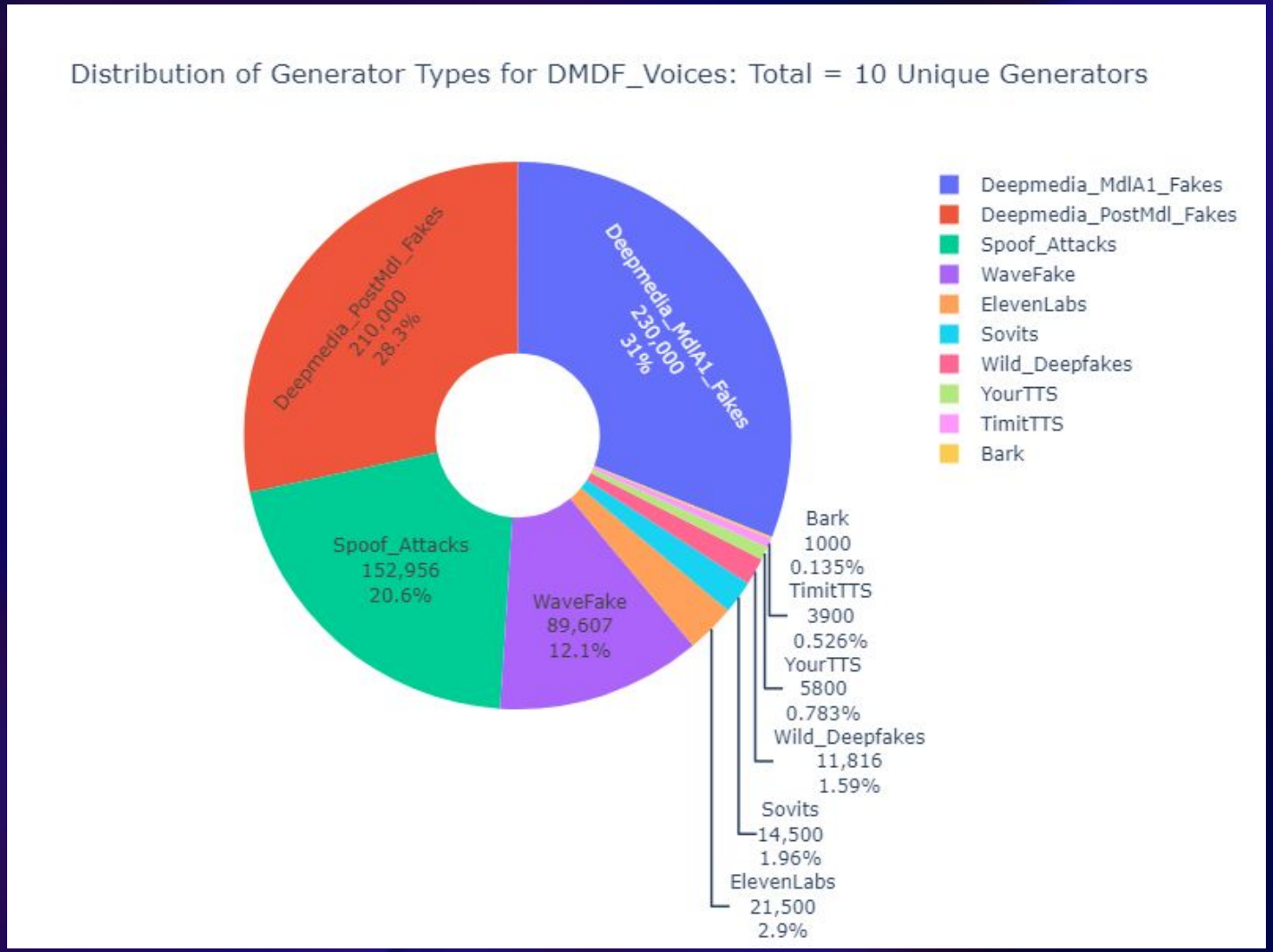
DeepMedia Datasets Contains 1M+ High-Quality Fake Voices and 2M+ High-Quality Real Voice from 10+ Languages





Combating DeepFakes Requires Dataset Generation: Voice

DeepMedia Datasets Contains Large Amounts of Fake Voice Data from Every Major AI Voice Algorithm



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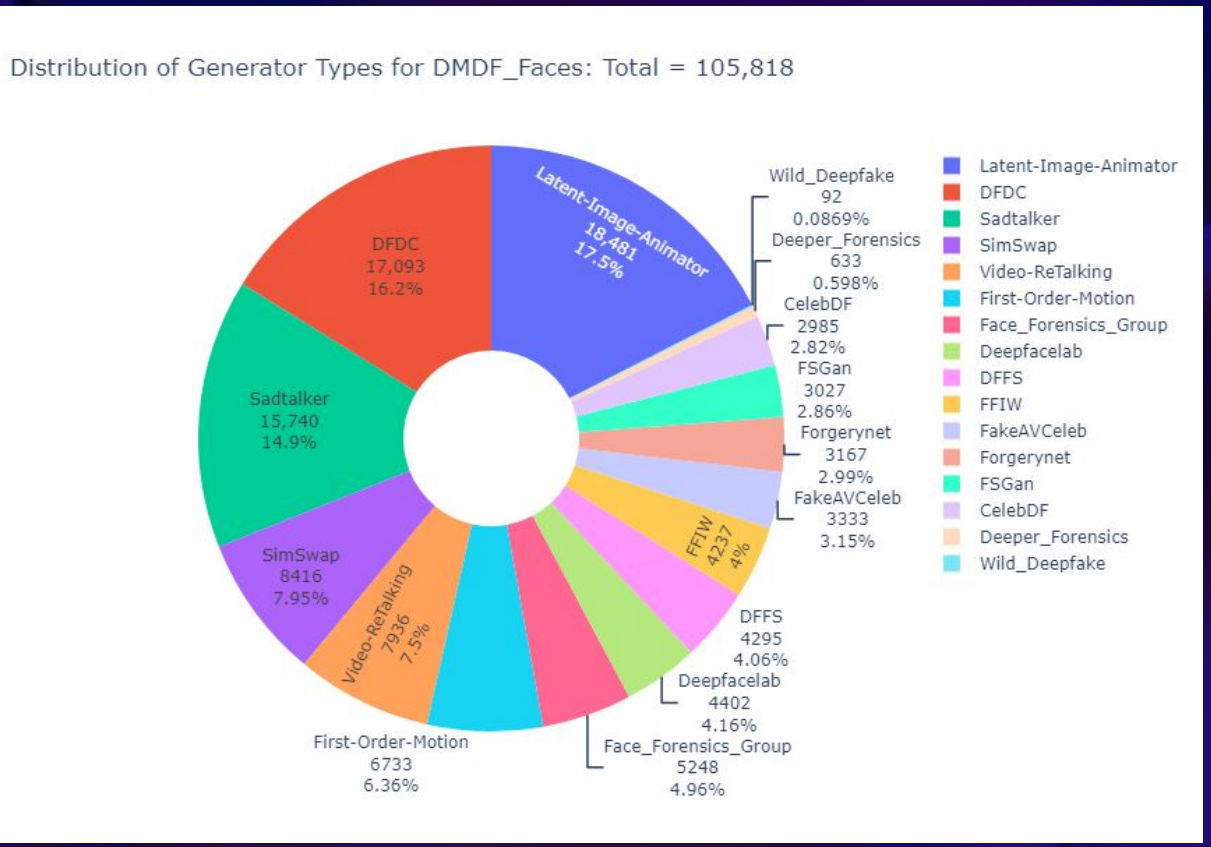
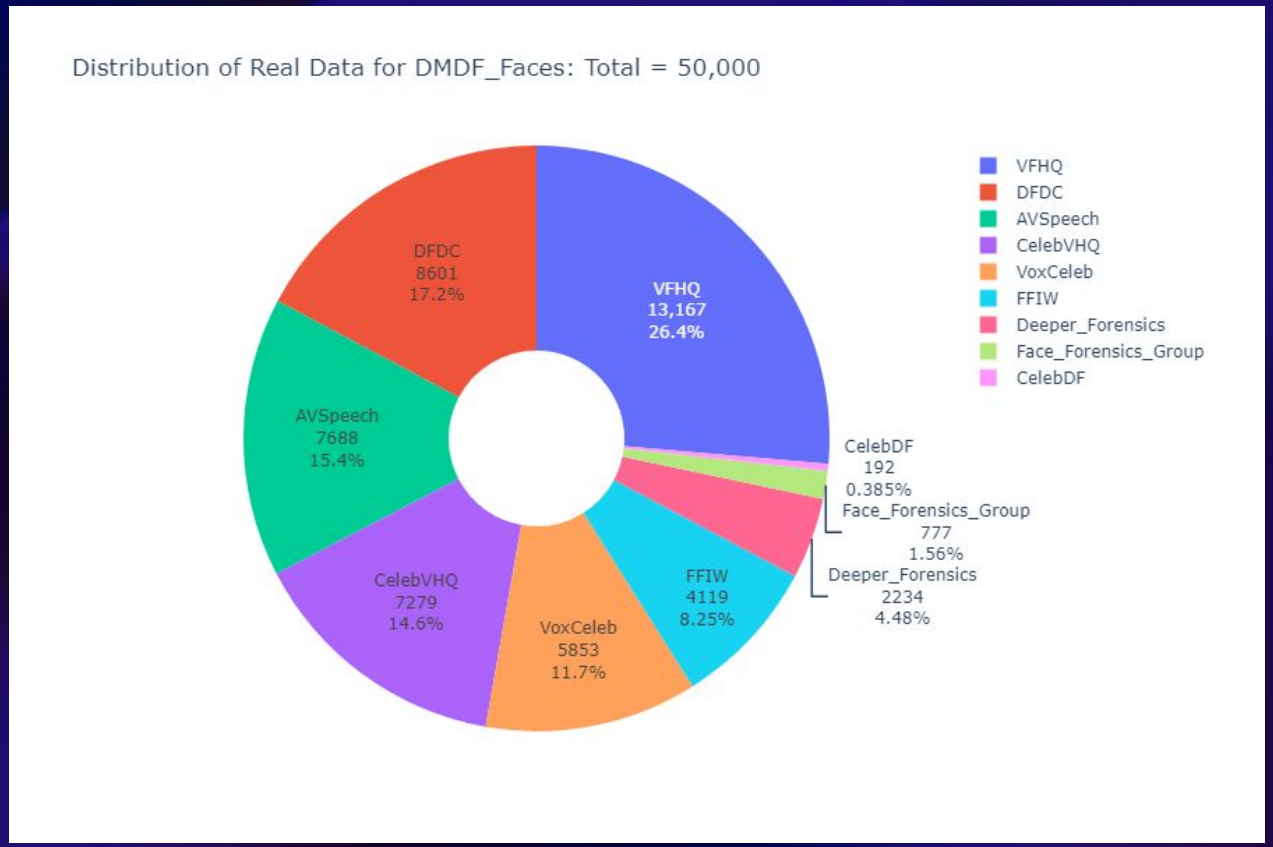
Combating DeepFakes Requires Dataset Generation: Face

DeepMedia Datasets Contains 100K+ High-Quality Fake and 50K+ High-Quality Real Faces from a Diverse Range of Data Sources





Training and Evaluating Algorithms to Detect AI Manipulations in Text, Voices, and Faces w/ High Accuracy

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State of the Art Classification Algorithms

DM-TextDetector-1

Uses a pretrained LLM to calculate burstiness and perplexity of potentially generated text to determine an overall detection probability.

DM-VoiceDetector-1

A novel Wav to Vector based Deepfake Detector trained by predicting speech units for masked speech. Proprietary to DeepMedia.

DM-FaceDetector-1

A memory efficient Video Detection architecture designed for visual recognition. Proprietary to DeepMedia.

DM-TextDetector-2

A custom-trained LLM specifically tuned to classify text and authentic or AI-generated with an associated confidence score.

DM-VoiceDetector-2

A unique Convolution Neural Network(CNN) based approach trained using Knowledge Distillation from Transformers

DM-FaceDetector-2

Powerful Deepfake Detection Models that combine an Efficient Network and a Vision Transformer.

DM-TextDetector-3

A classic text-based classification algorithm that is trained to detect AI-generated text through standard NLP-based classification.

DM-VoiceDetector-3

An Audio Detection model based upon a CNN, which is characterized by good generalization and stability results.

DM-FaceDetector-3

A Video Detection model that enhances the power of Video Transformers with a Video Uniformer backbone.Proprietary to DeepMedia.

Training Details And Results

Data

Text Data

5 Generators
500,000 Samples
Unique Authors
8 Languages

- GPT4
- Bard
- 3 Others

Voice Data

10 Generators
1 Million+ Samples
10,000+ IDs
15 Languages

- Eleven Labs
- SoVits
- 8 Others

Facial Data

15 Generators
100,000 Videos
50,000 +
Diverse Inputs

- DeepFaceLab
- Sadtalker
- 13 Others

Detectors

- DM-TextDetector-1
- DM-TextDetector-2
- DM-TextDetector-3
- DM-VoiceDetector-1
- DM-VoiceDetector-2
- DM-VoiceDetector-3
- DM-FaceDetector-1
- DM-FaceDetector-2
- DM-FaceDetector-3

Results / Outputs

Overall Accuracy: **85%**
DM-TextDetector-1: 88%
DM-TextDetector-2: 85%
DM-TextDetector-3: 82%

Languages: **English, Russian, Mandarin, Ukrainian**
Data Types: **Social Media Posts, News Articles, Conversational Transcripts**

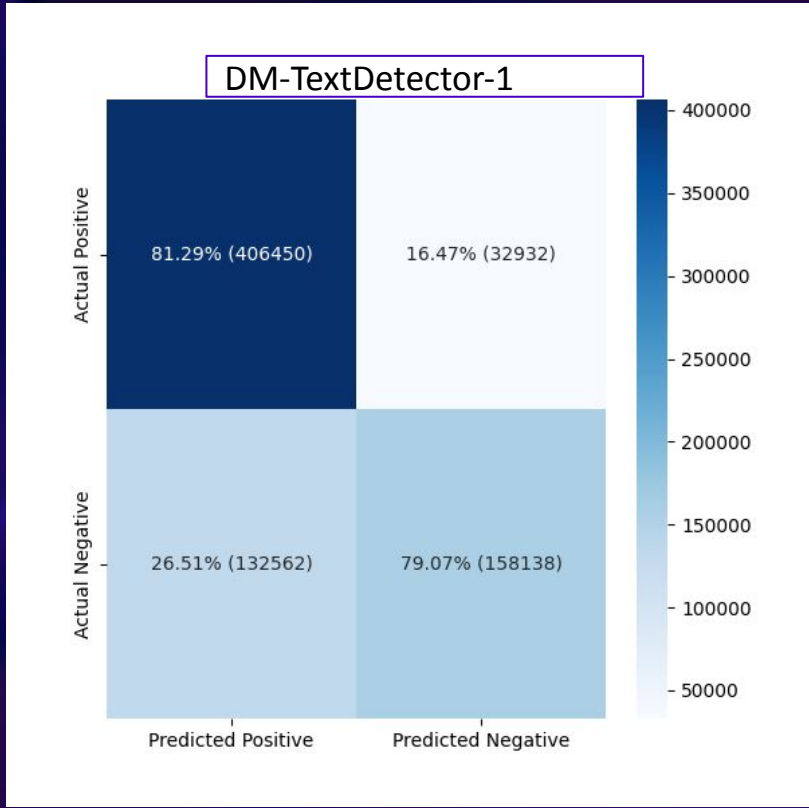
Overall Accuracy: **98%**
DM-VoiceDetector-3: 99%
DM-VoiceDetector-2: 97%
DM-VoiceDetector-1: 97%

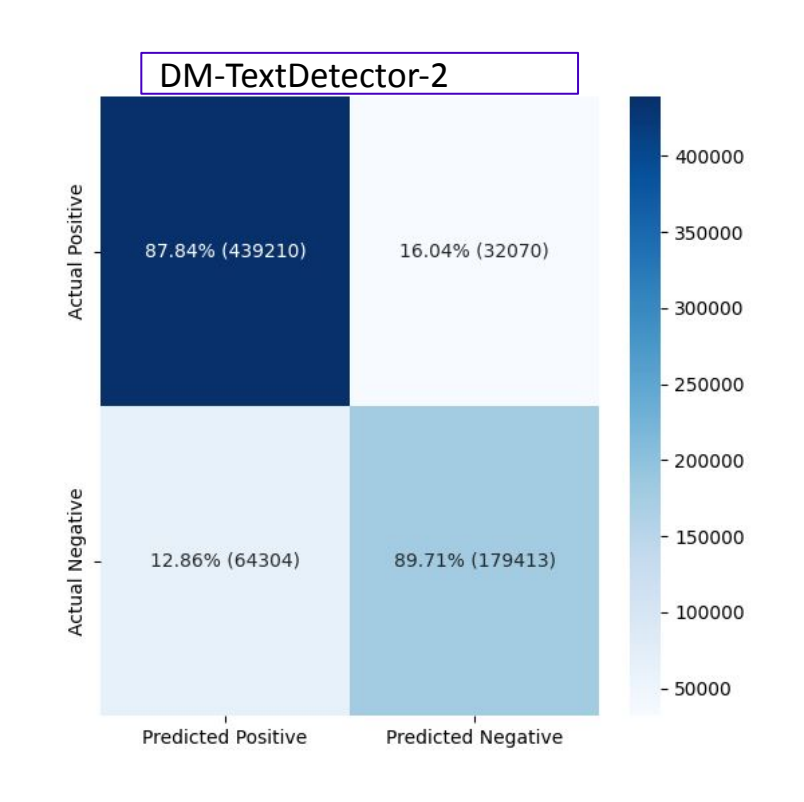
Languages: **20, Emphasis on Ukrainian, Russian, Mandarin, and English**
Applicability: **High generalizability across languages**

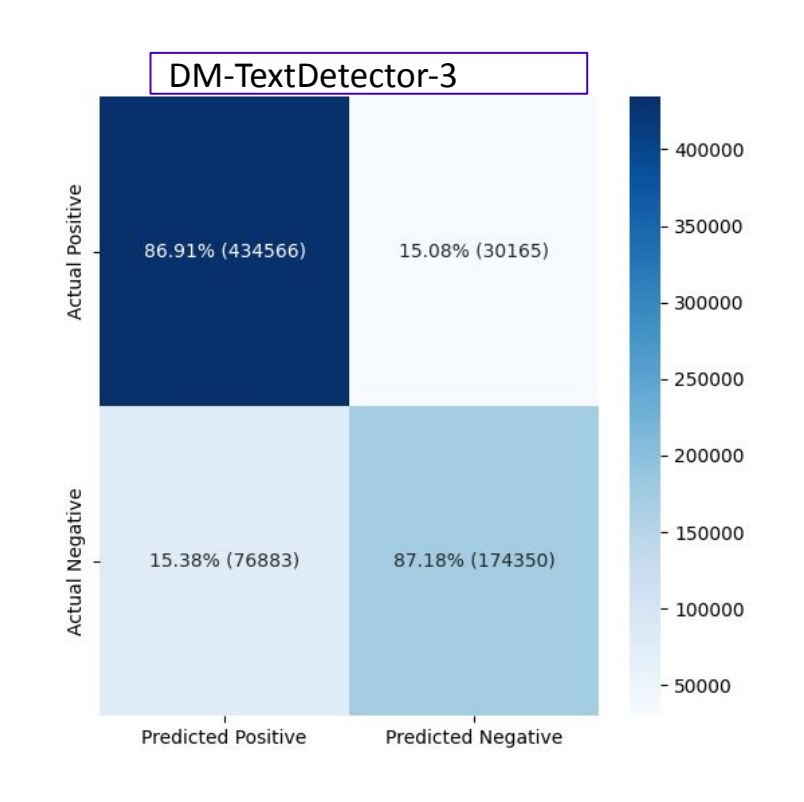
Overall Accuracy: **98%**
DM-FaceDetector-2: 96%
DM-FaceDetector-3: 99%
DM-FaceDetector-1 94%

Diversity: **High Diversity across Races, Ages, and Genders**
Video Types: **Distorted Quality to Super Resolution. Wide Range of video types**

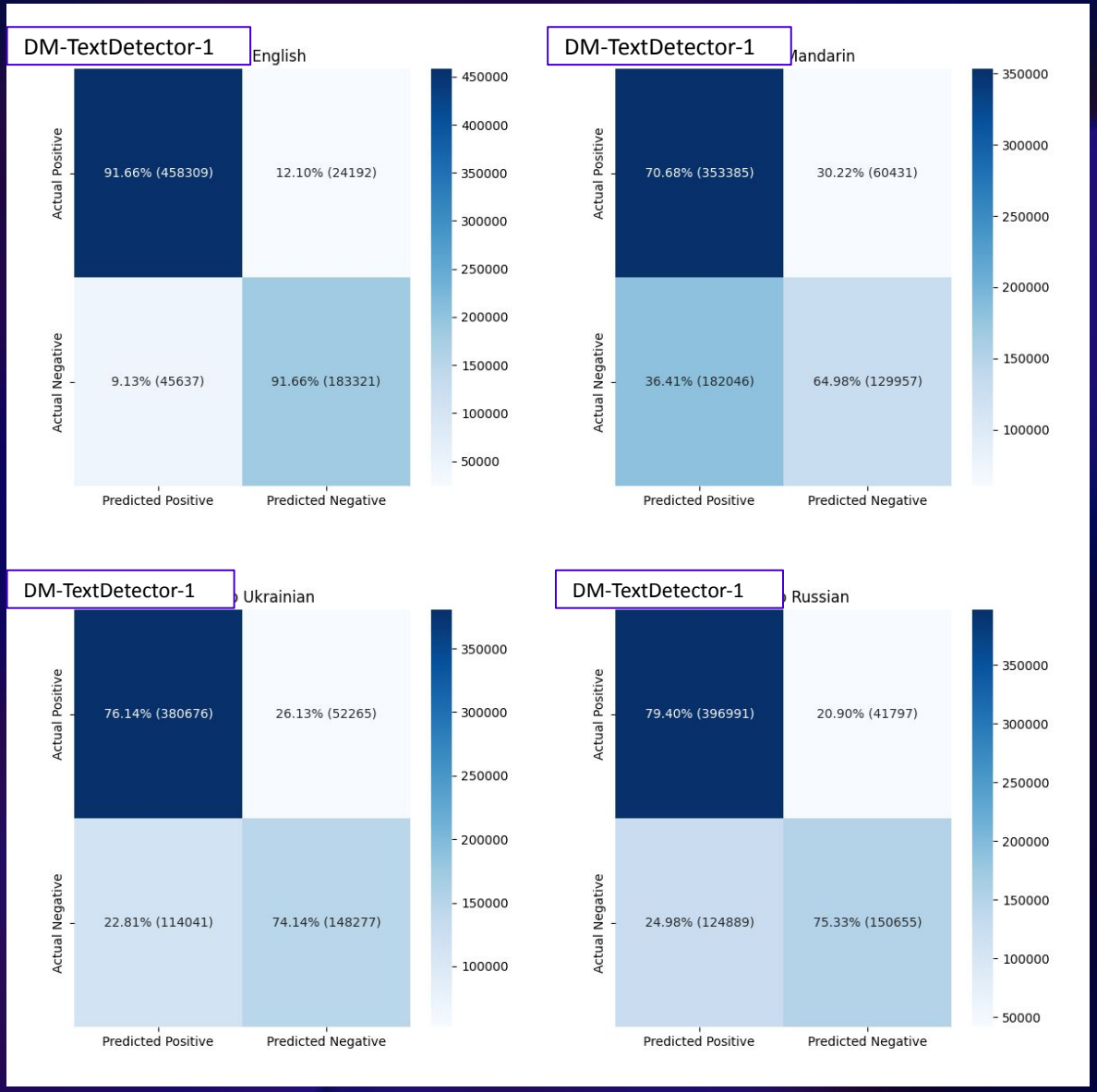
Text Detection Results







Text Detection Results



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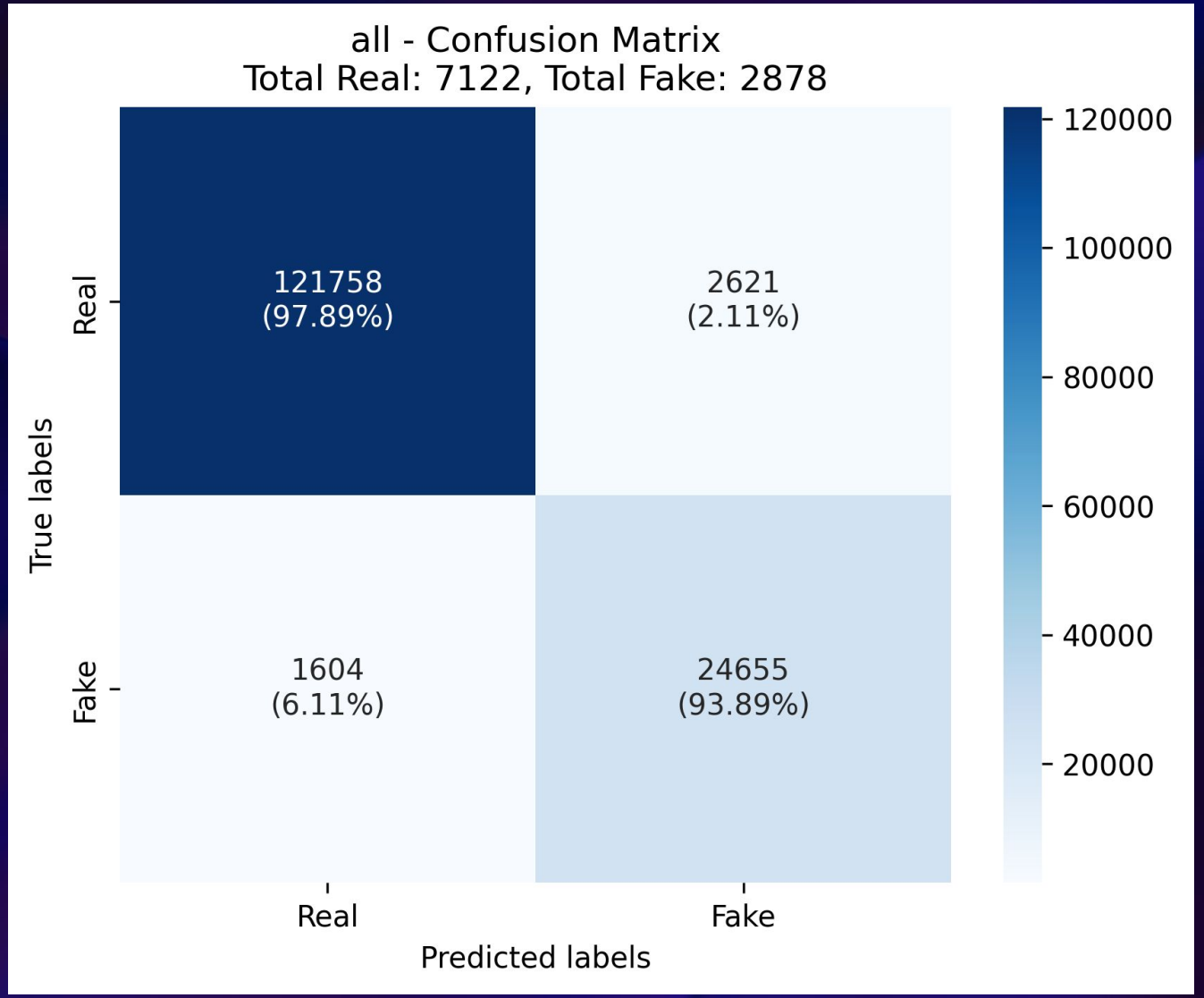
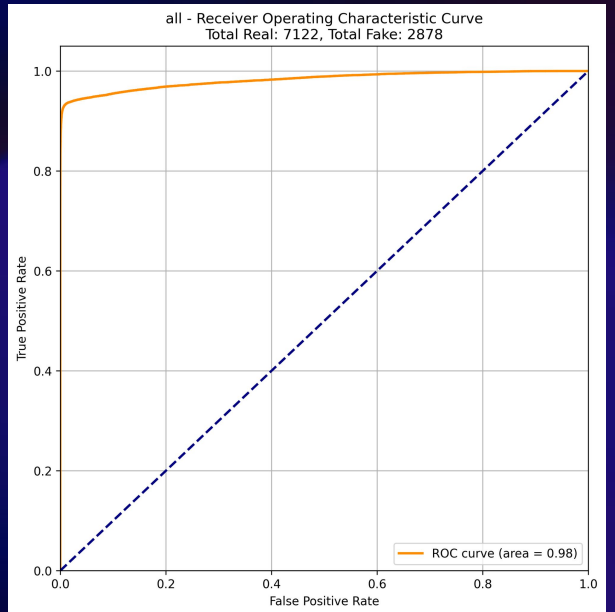
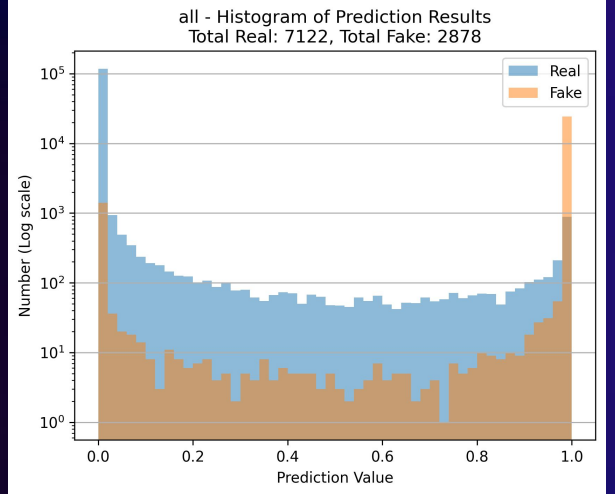
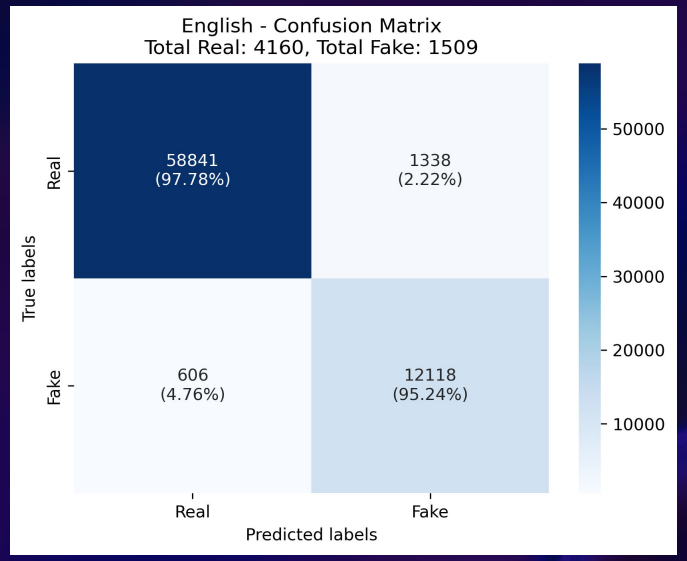
Voice Detection Results - DM-VD-2

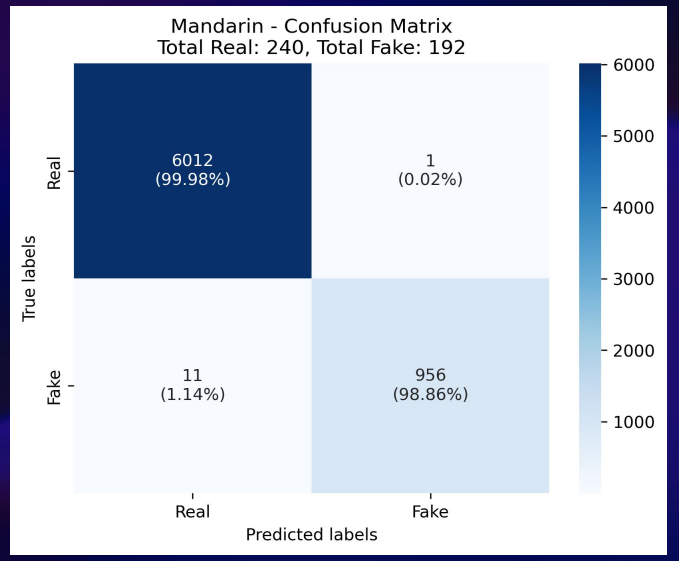


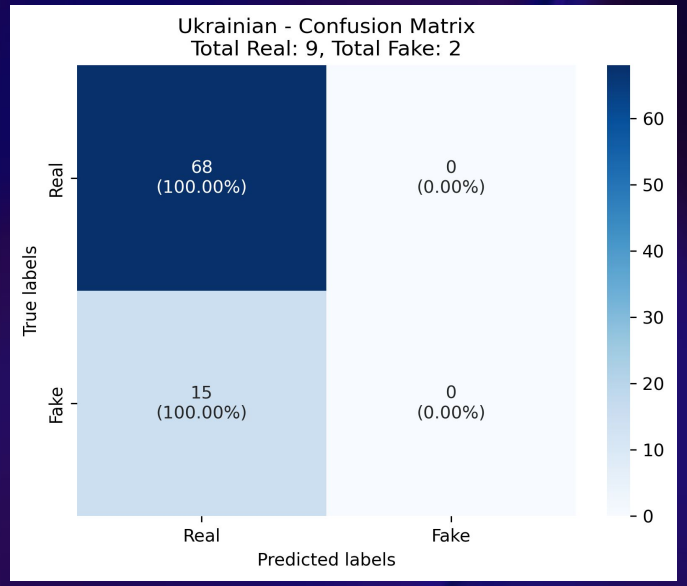


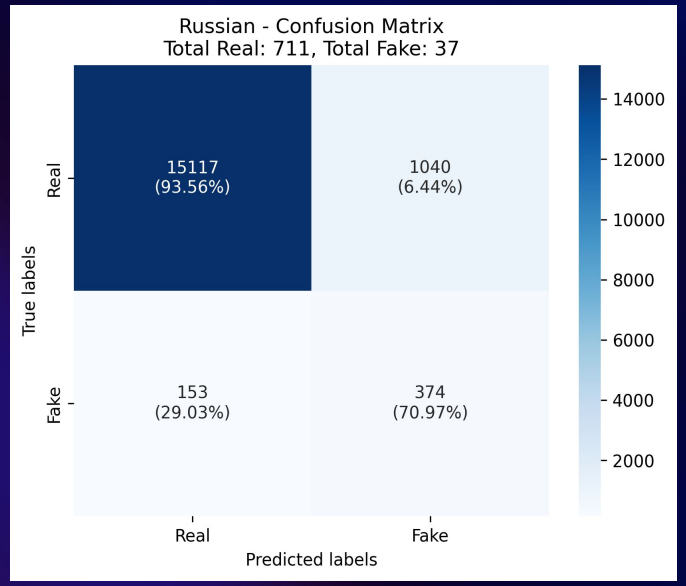


Voice Detection Results - DM-VD-2









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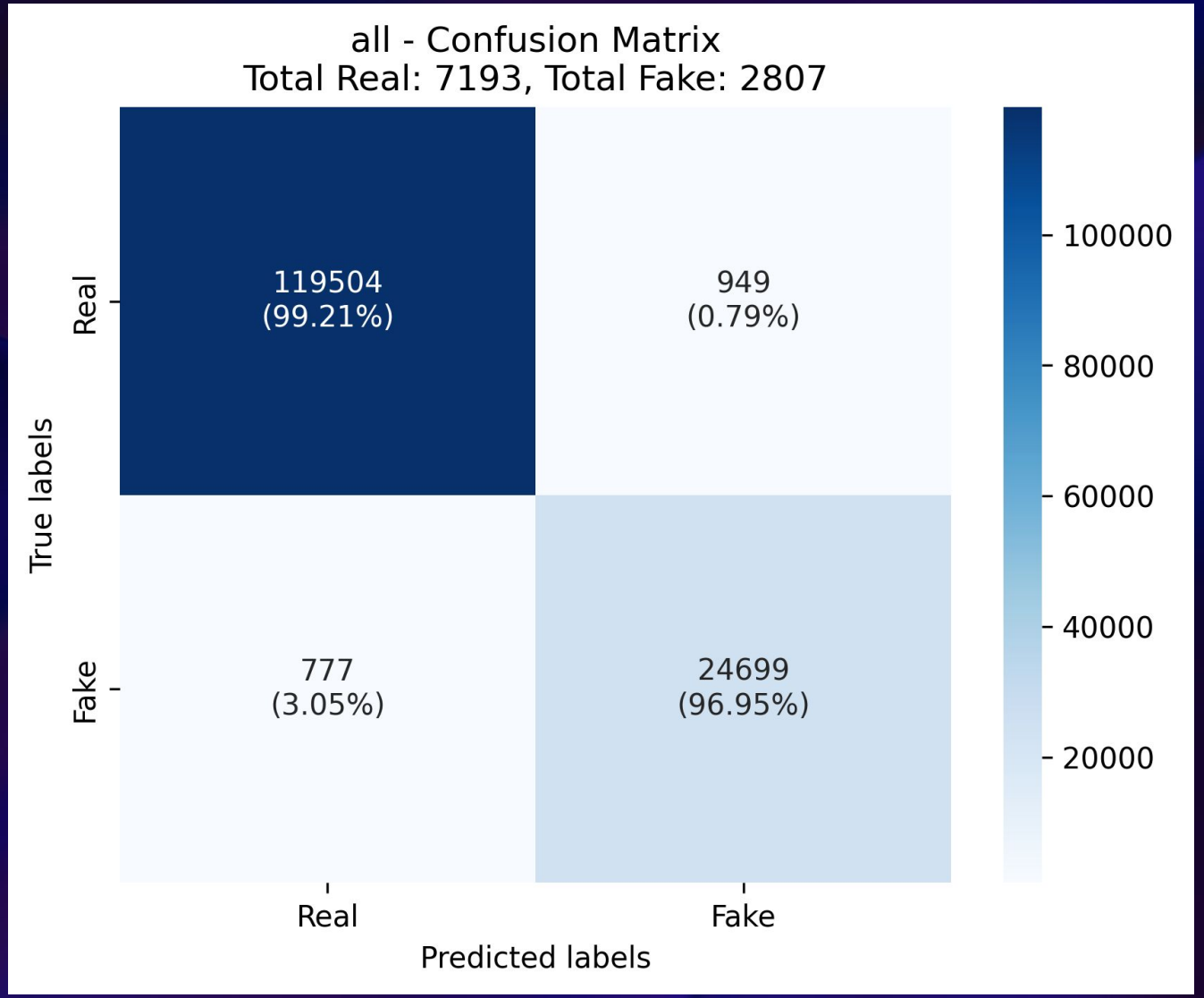
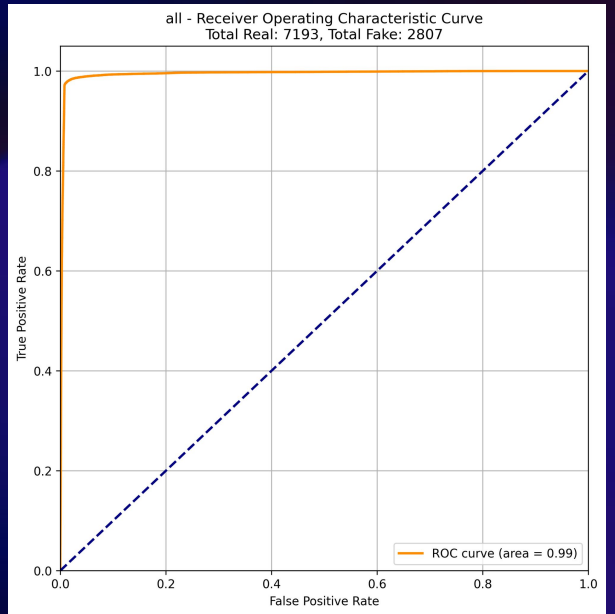
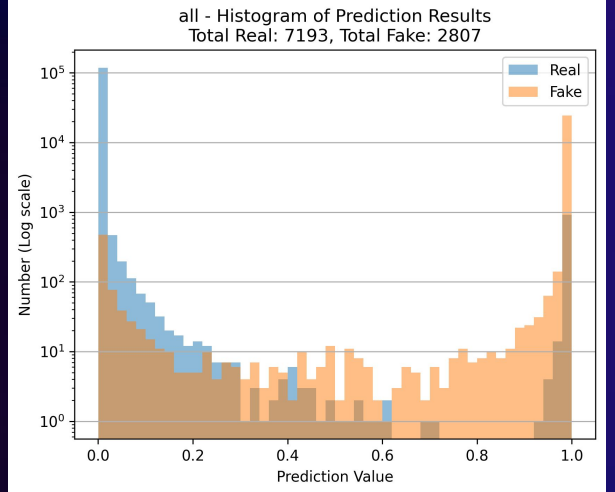
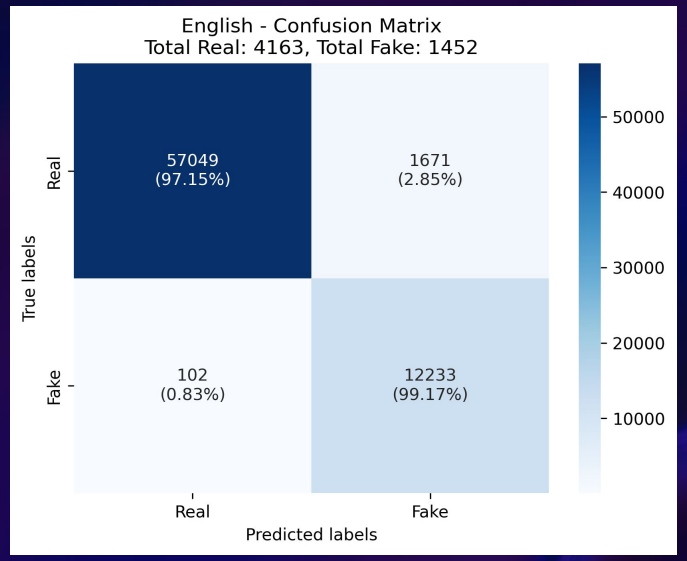
Voice Detection Results - DM-VD-3

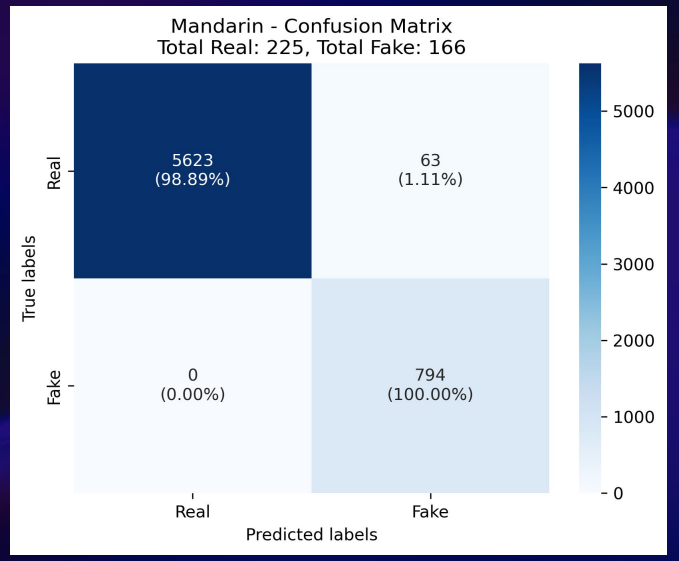


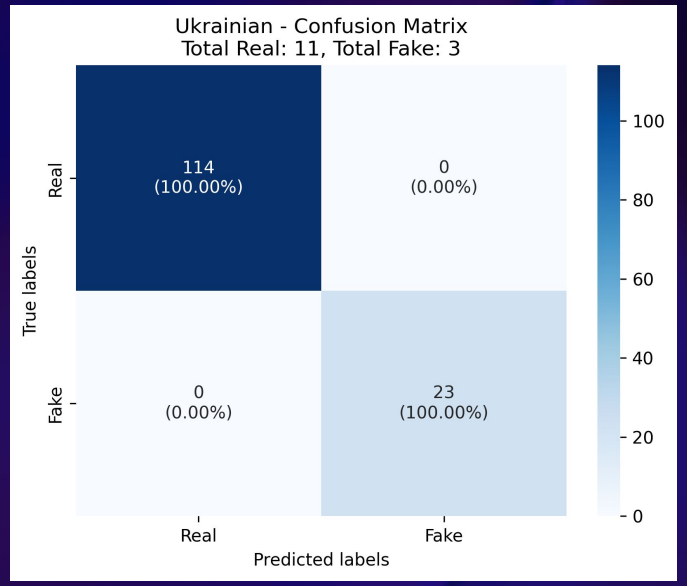


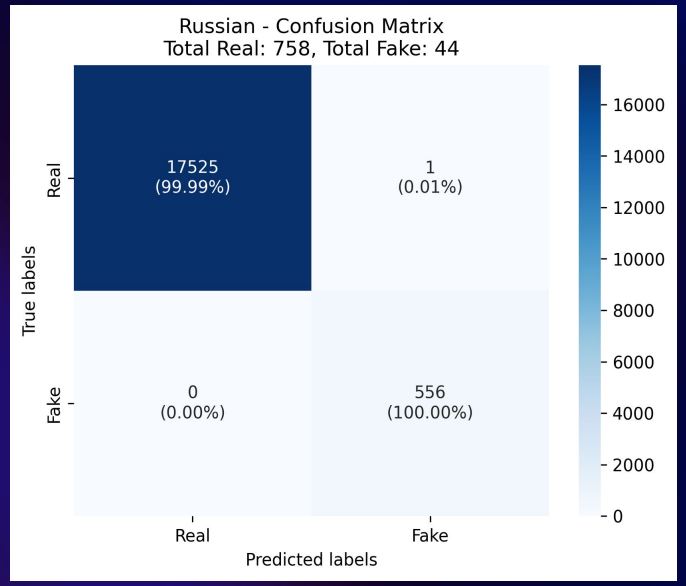


Voice Detection Results - DM-VD-3









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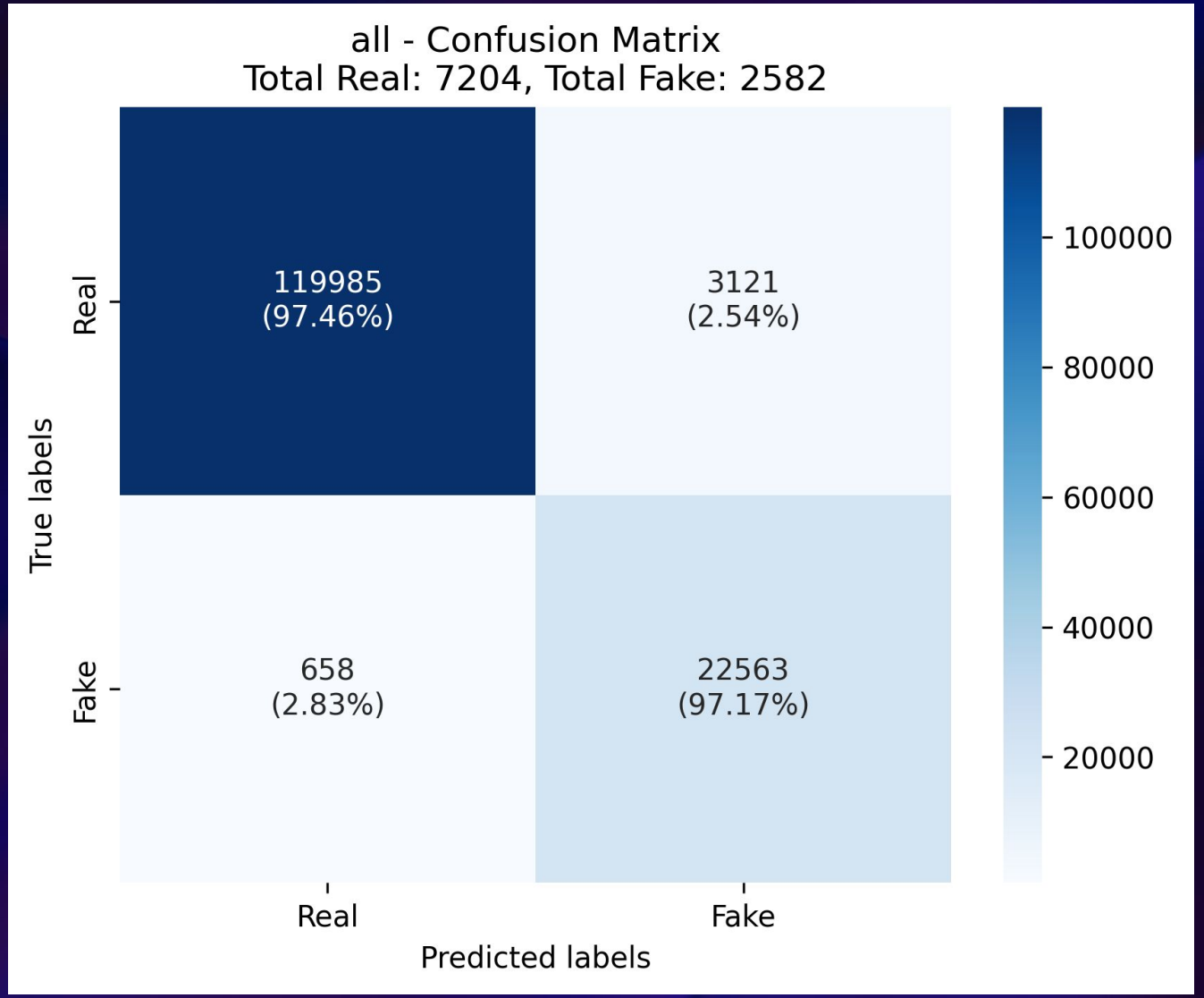
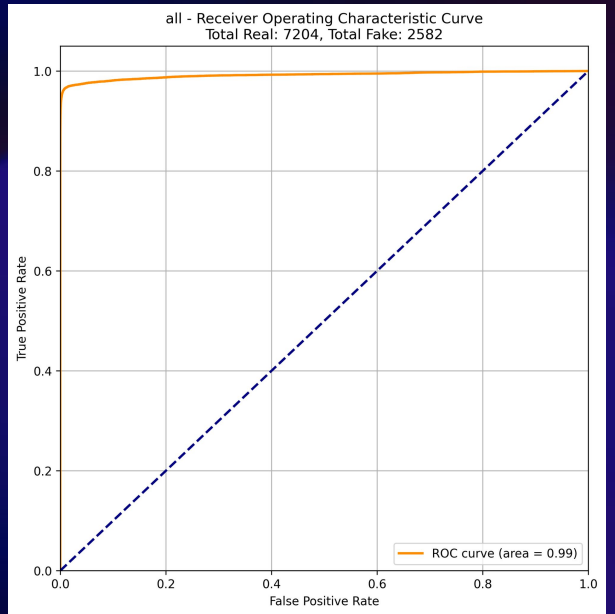
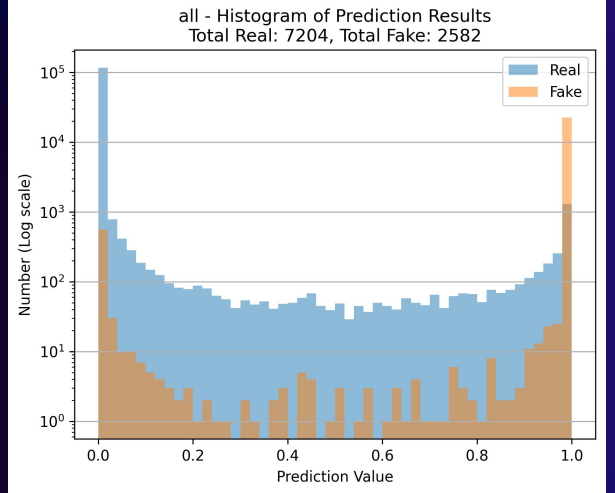
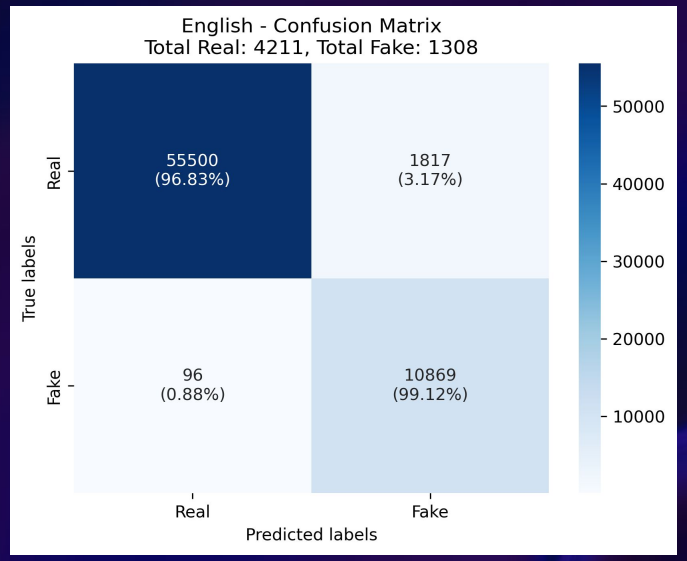
Voice Detection Results - DM-VD-1

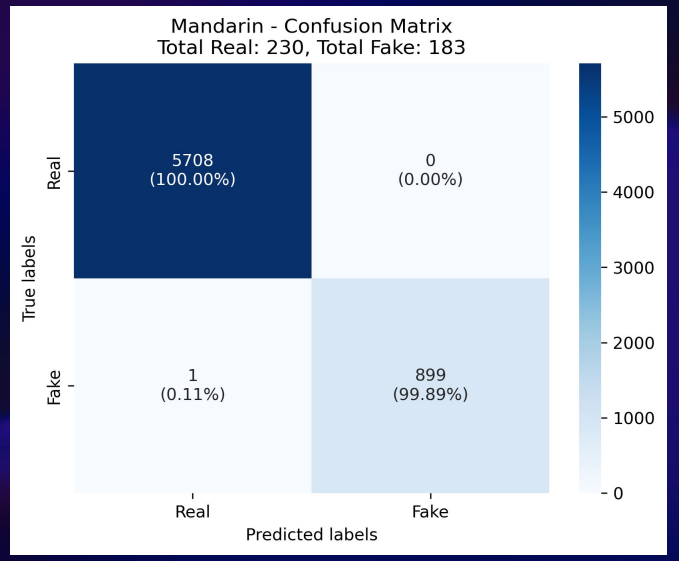


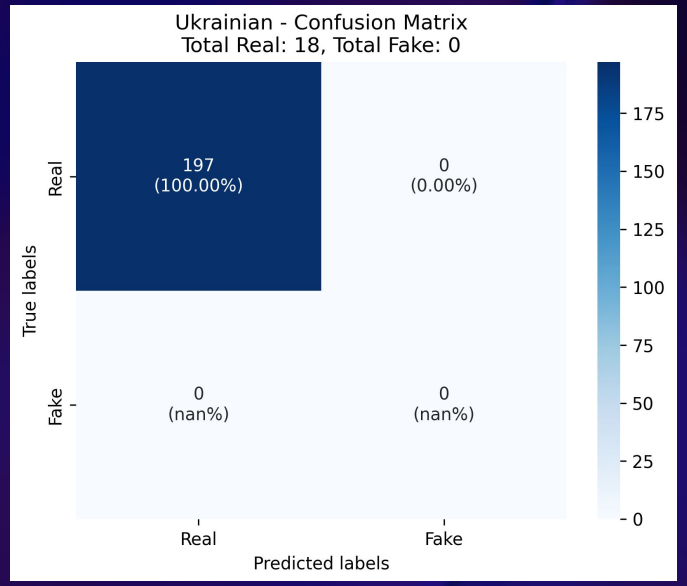


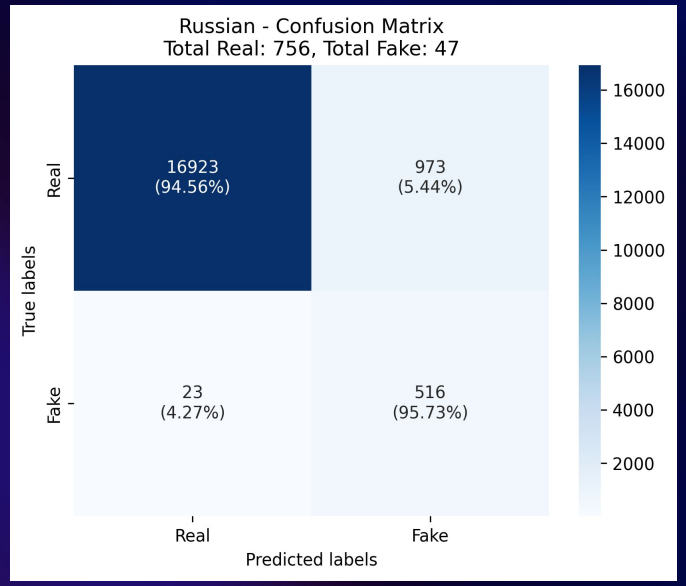


Voice Detection Results - DM-VD-1









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Adding Audio Augmentations

```
apply_augmentation = Compose(
    transforms=[
        Shift(
            min_shift=0.05,
            max_shift=0.05,
            shift_unit="seconds",
            p=0.2,
            sample_rate=24000,
            rollover=False,
            output_type="dict",
        ),
        Gain(
            min_gain_in_db=-3.0,
            max_gain_in_db=3.0,
            p=0.2,
        ),
        Padding(
            p=0.1,
            sample_rate=WAVE_FAKE_SR
        ),
        PolarityInversion(
            p=0.5,
        ),
        ApplyImpulseResponse(
            ir_paths="AudioFiles/RIRS_NOISES_16K/real_rirs_isotropic_noises",
            p=0.1,
        ),
        BandStopFilter(p=0.2),
        LowPassFilter(p=0.2),
        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/crowds_non_laughter_heavyvocals",
            min_snr_in_db=12.0,
            max_snr_in_db=40.0,
            p=0.1
        ),
        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/DNSFreesound",
            min_snr_in_db=12.0,
            max_snr_in_db=40.0,
            p=0.1
        ),
        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/MUSANmusicremovedvoice",
            min_snr_in_db=12.0,
            max_snr_in_db=40.0,
            p=0.1
        ),
        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/MUSANnoiseSBOnly",
            min_snr_in_db=12.0,
            max_snr_in_db=40.0,
            p=0.1
        ),
        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/music_no_voice",
            min_snr_in_db=12.0,
            max_snr_in_db=40.0,
            p=0.1
        ),
        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/nature_ambient_sounds",
            min_snr_in_db=12.0,
            max_snr_in_db=40.0,
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        AddBackgroundNoise(
            background_paths="AudioFiles/Noise_wavs_organized_16K/nature_animal_sounds",
```
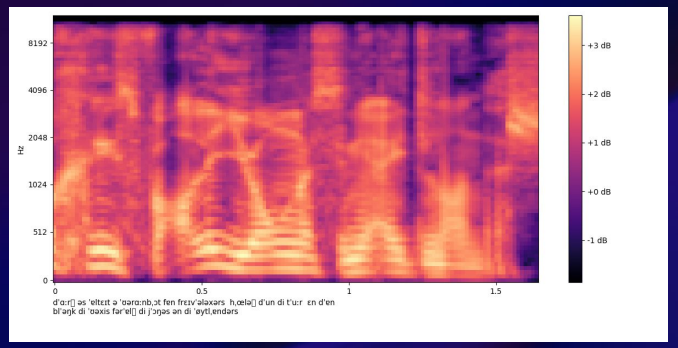
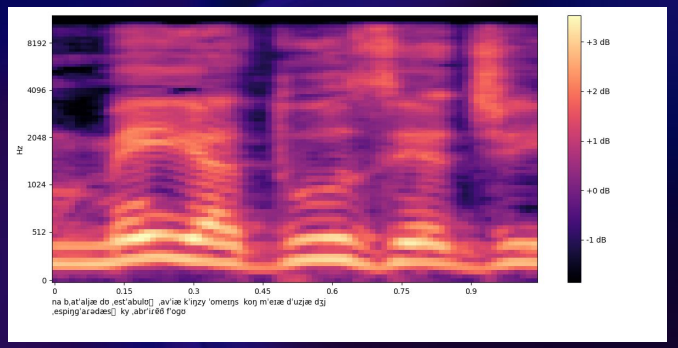
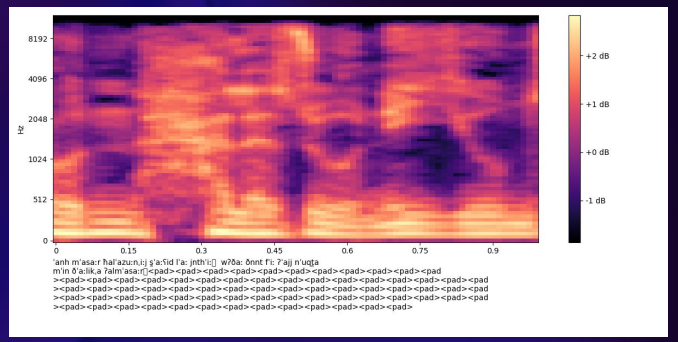
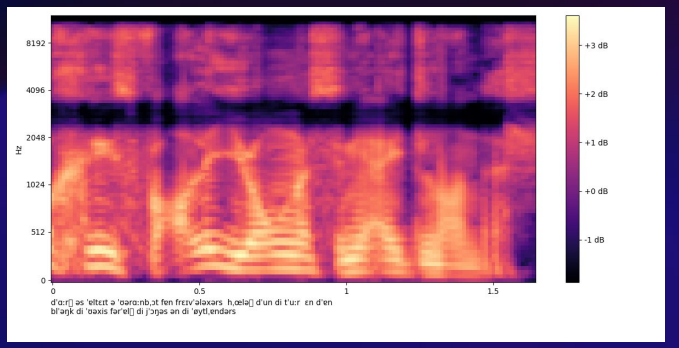

Original

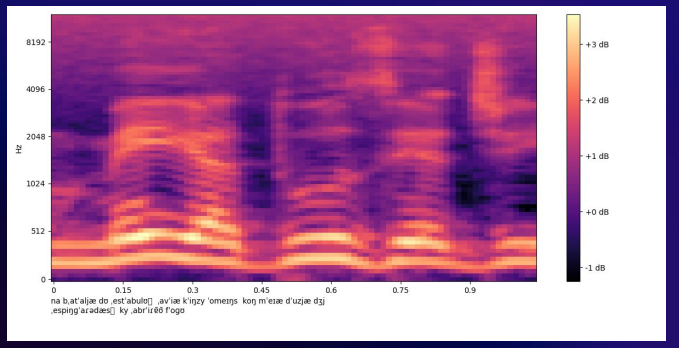


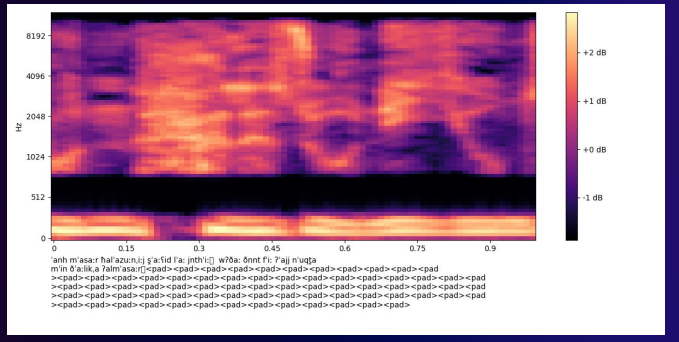




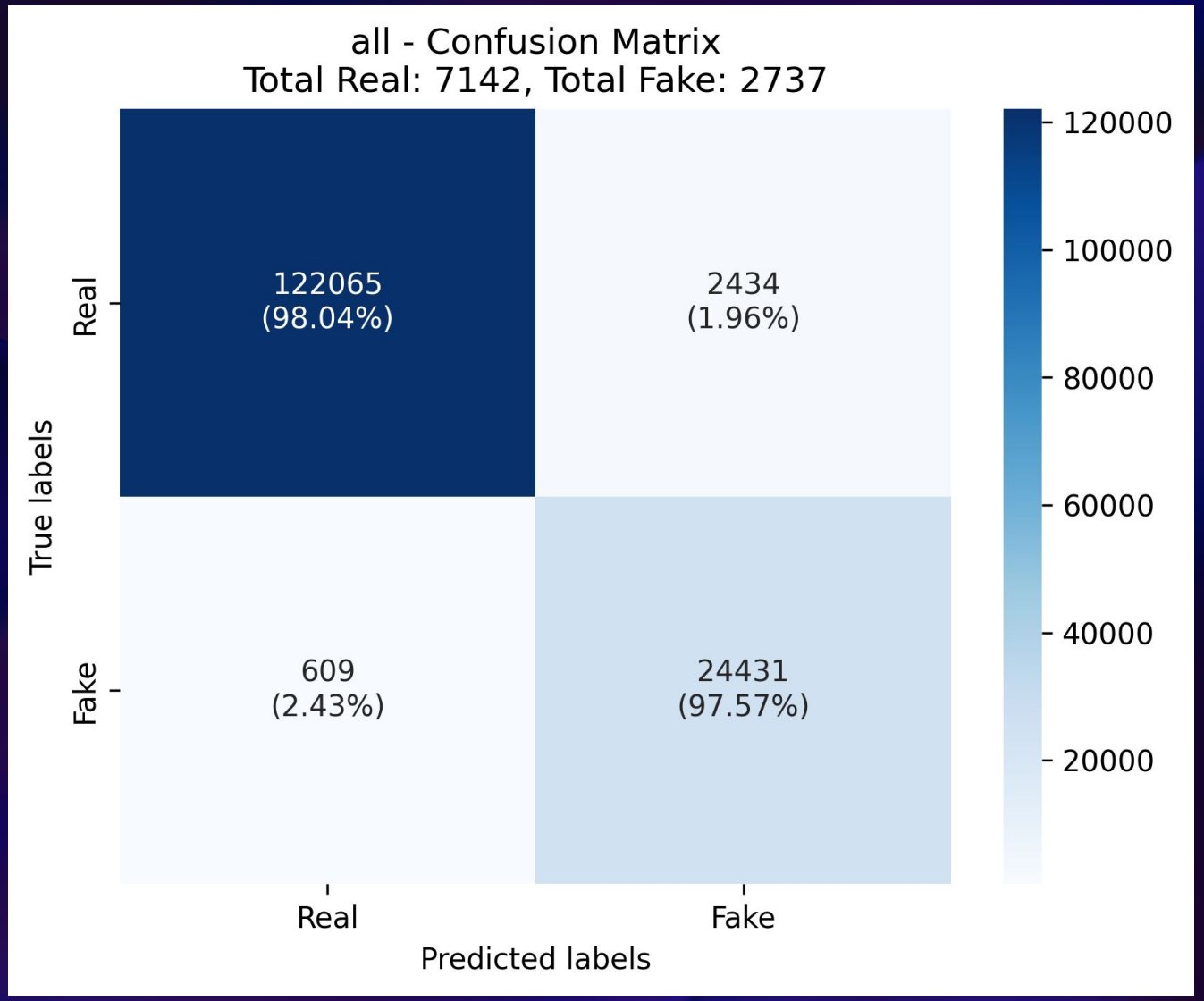
Augmented

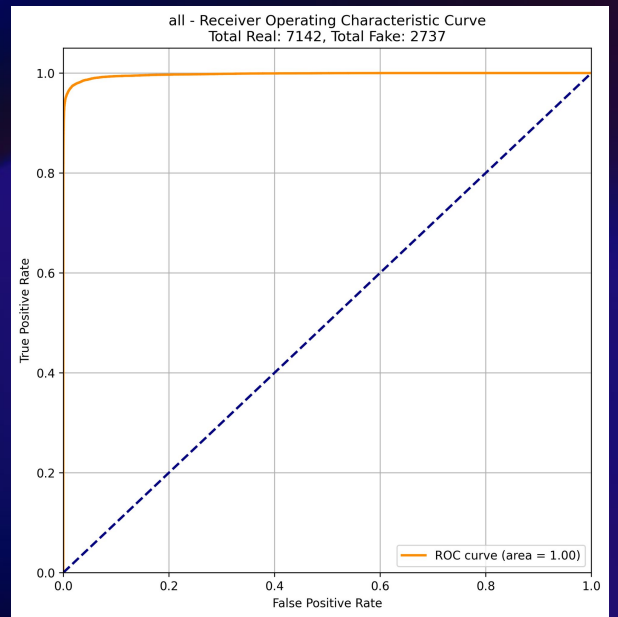


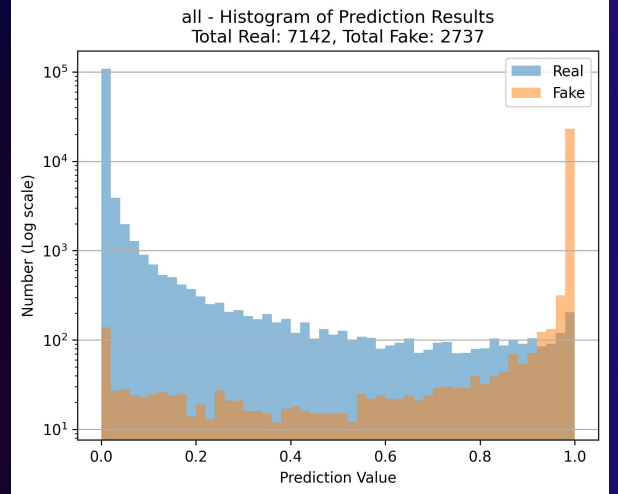




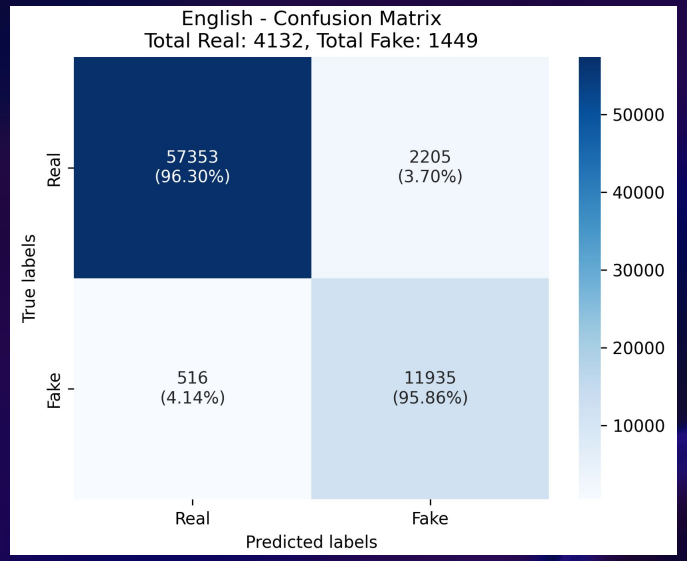
Voice Detection Results - DM-VD-2 Augmented

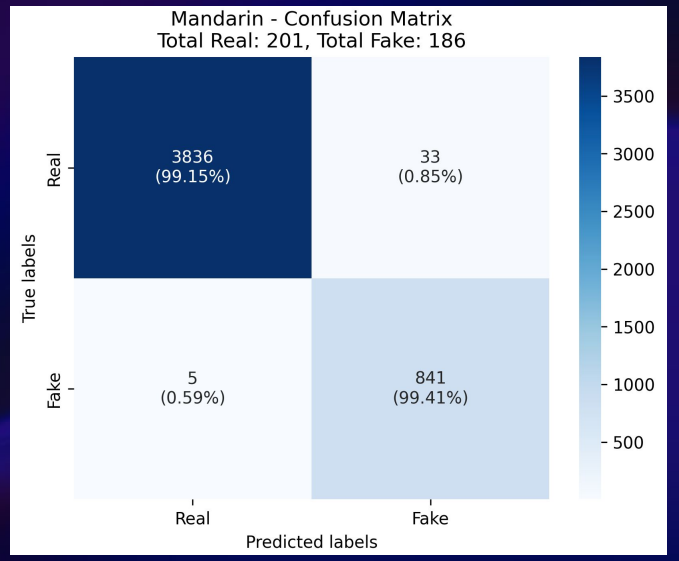


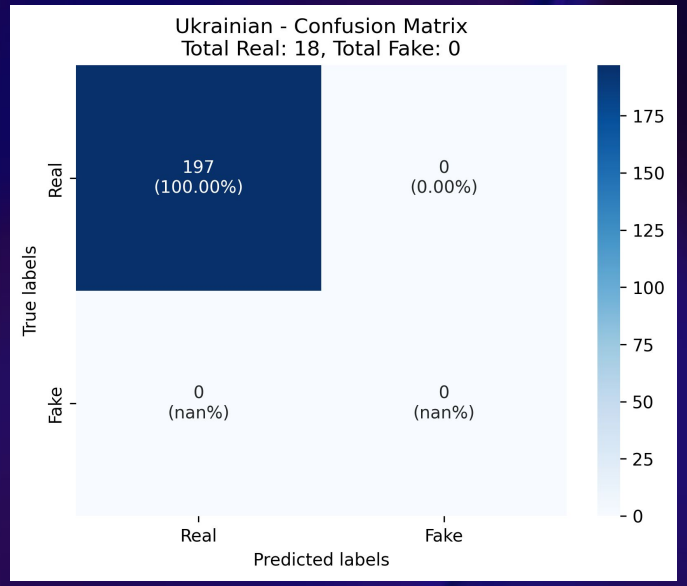


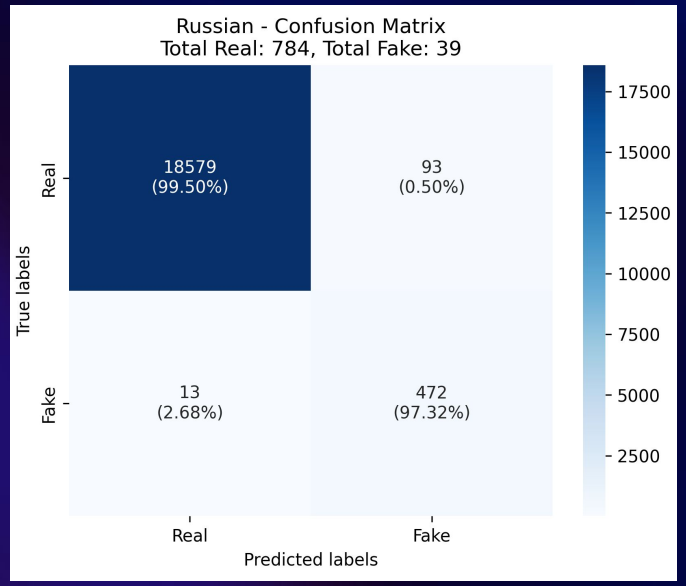


Voice Detection Results - DM-VD-2 Augmented









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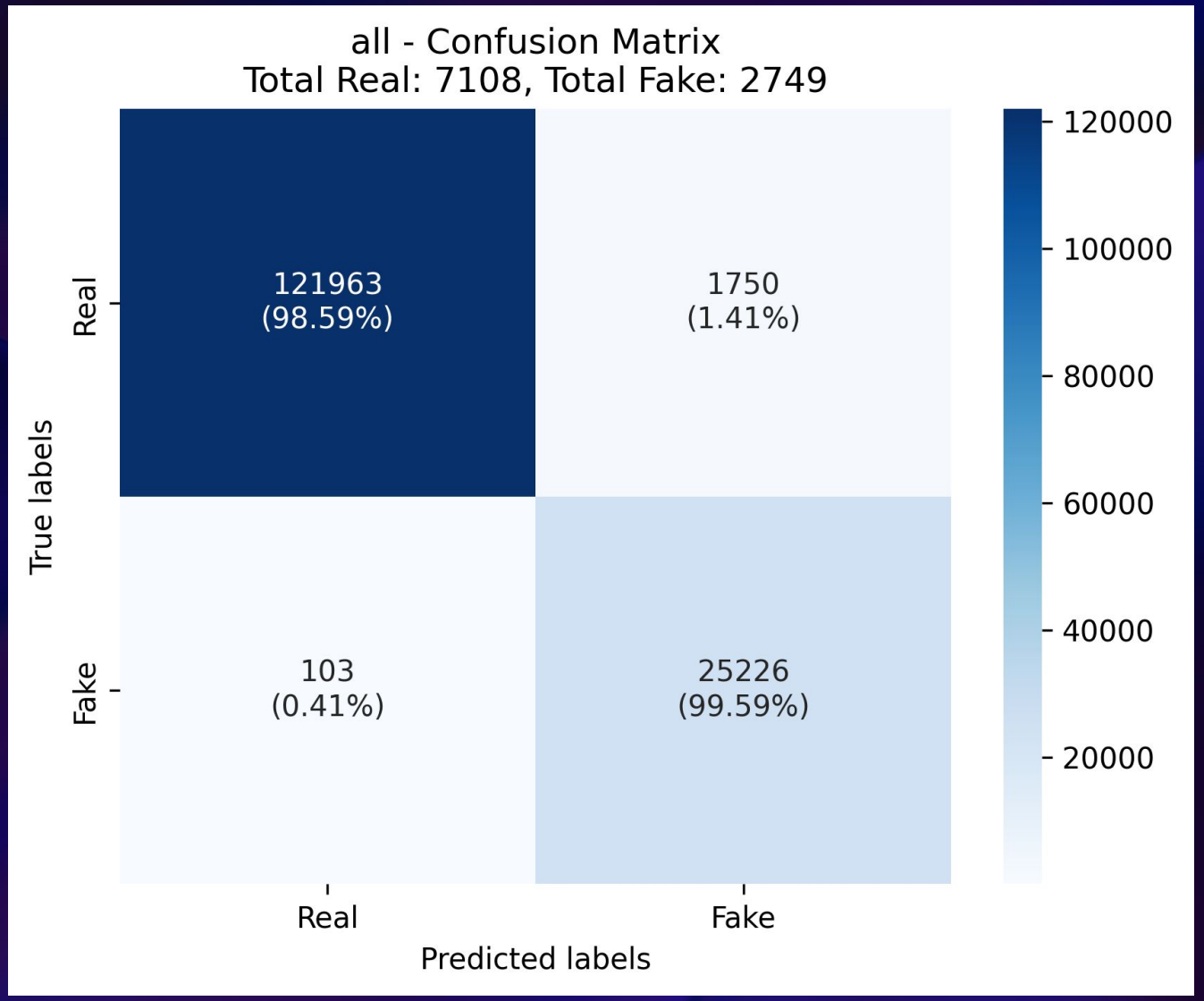
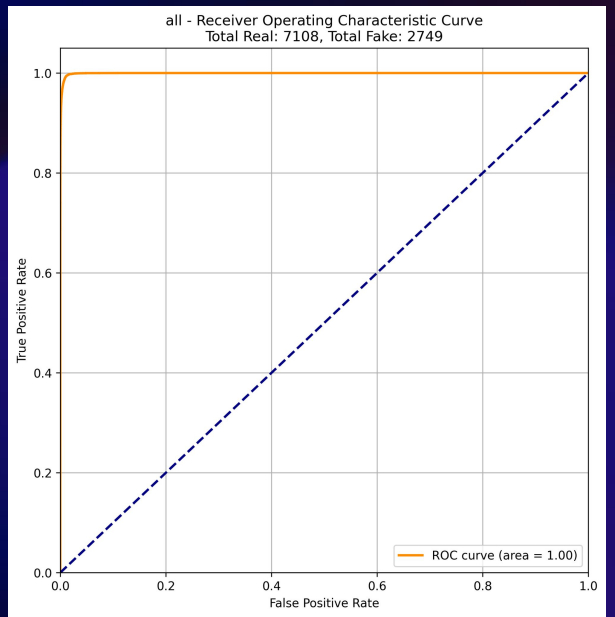
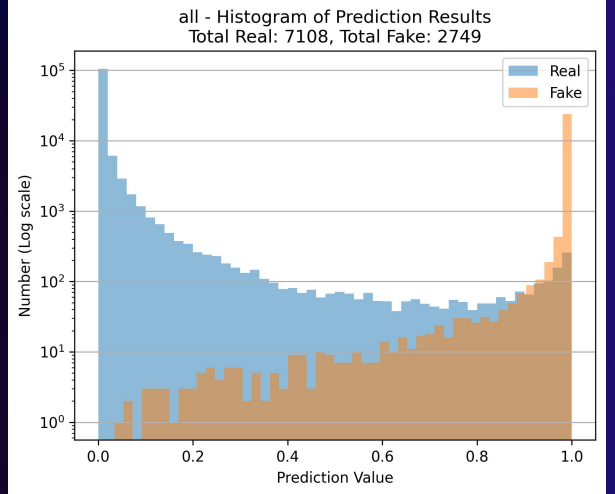
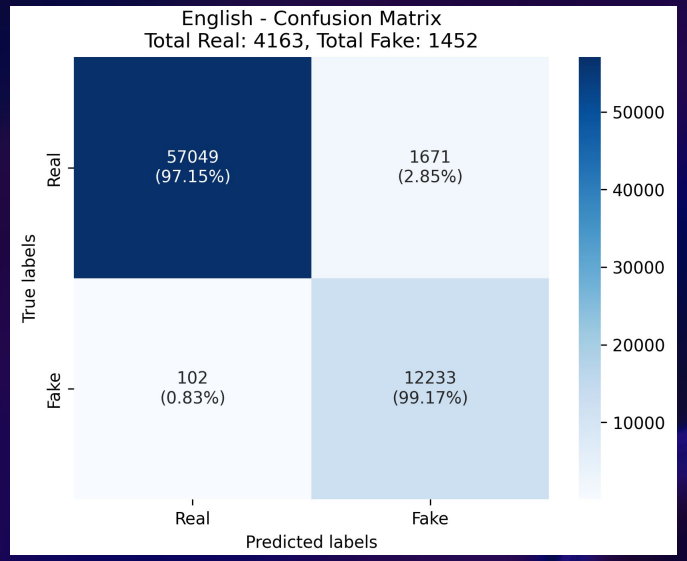
Voice Detection Results - DM-VD-3 Augmented

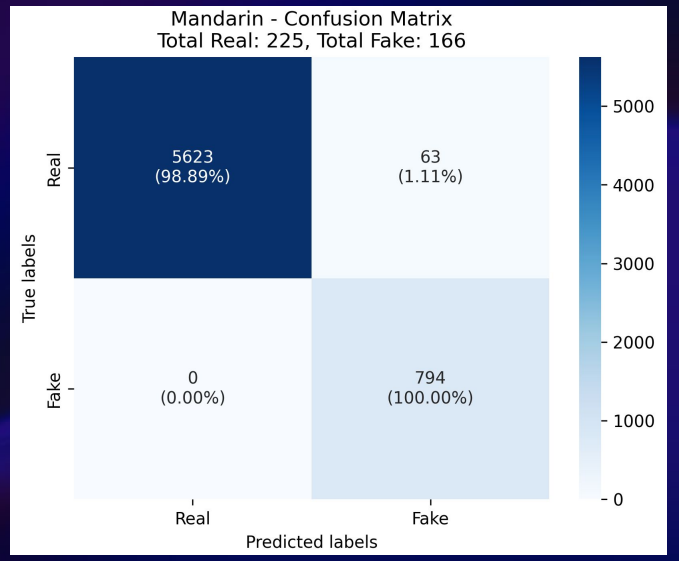


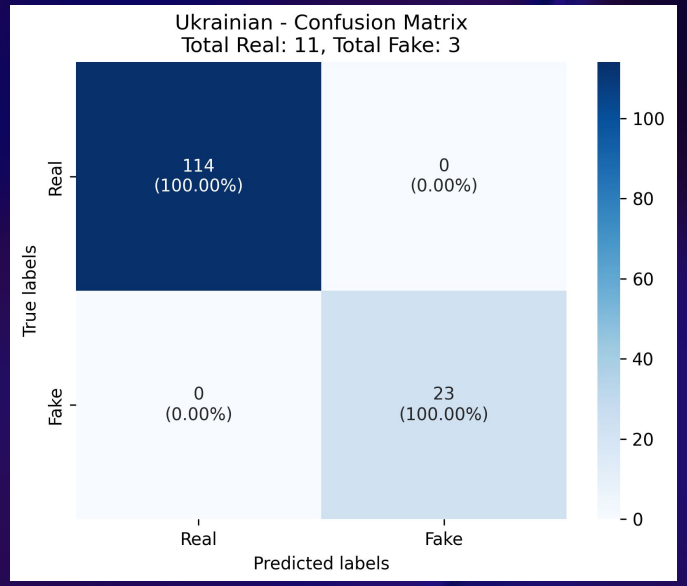


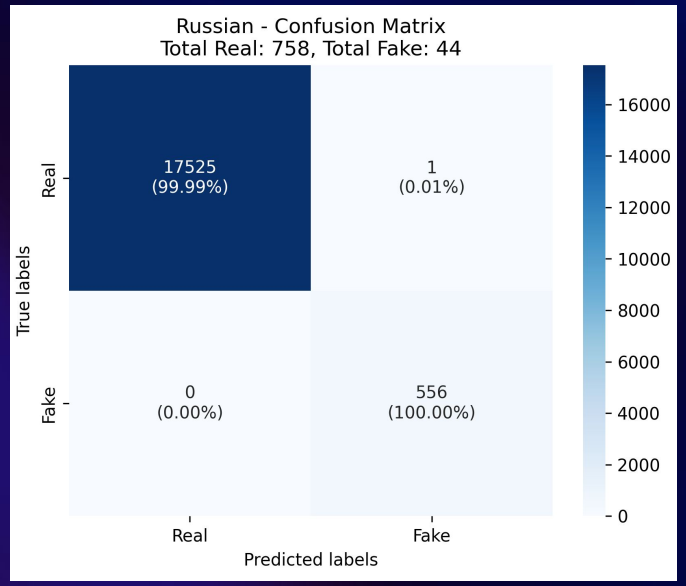


Voice Detection Results - DM-VD-3 Augmented

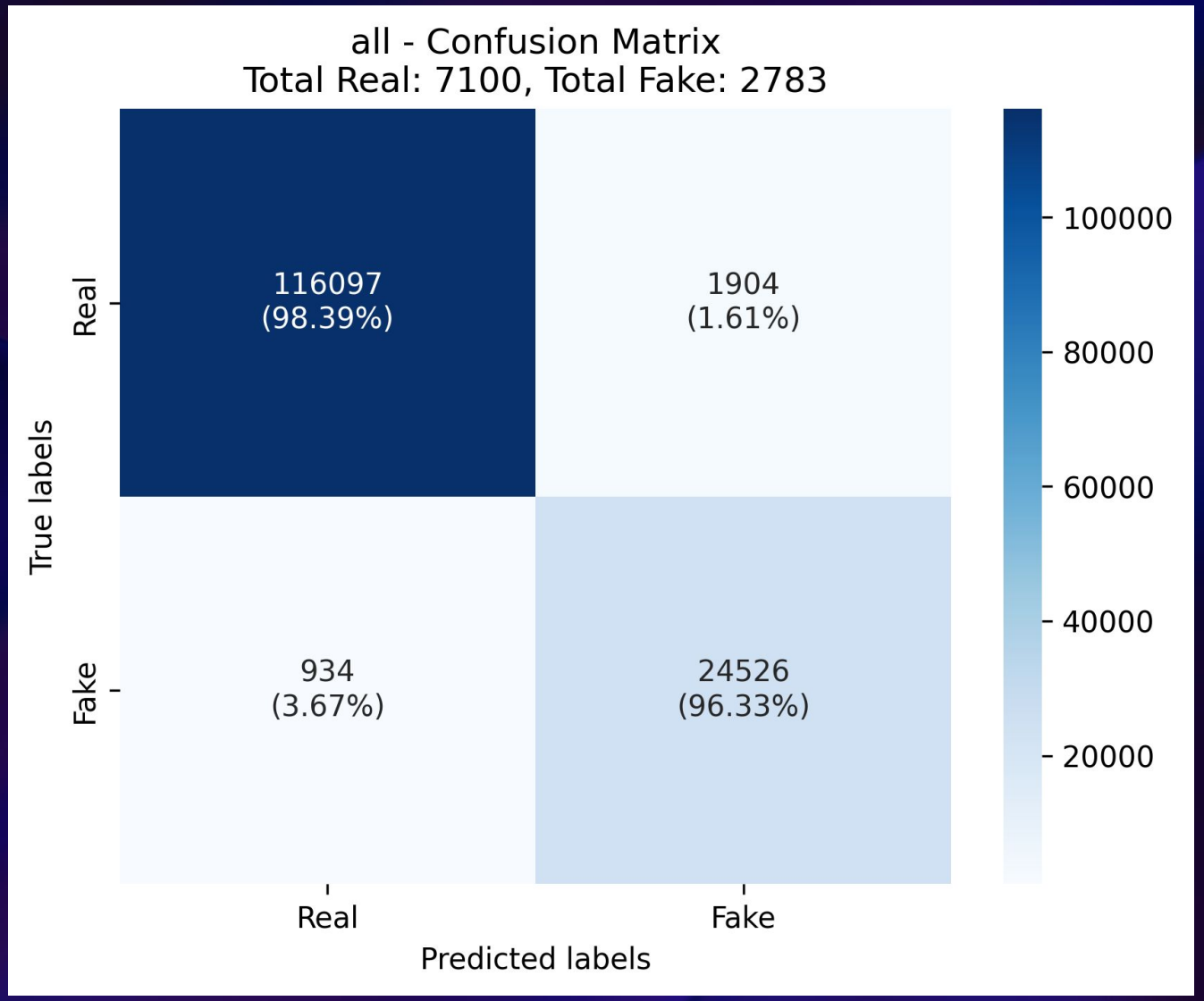


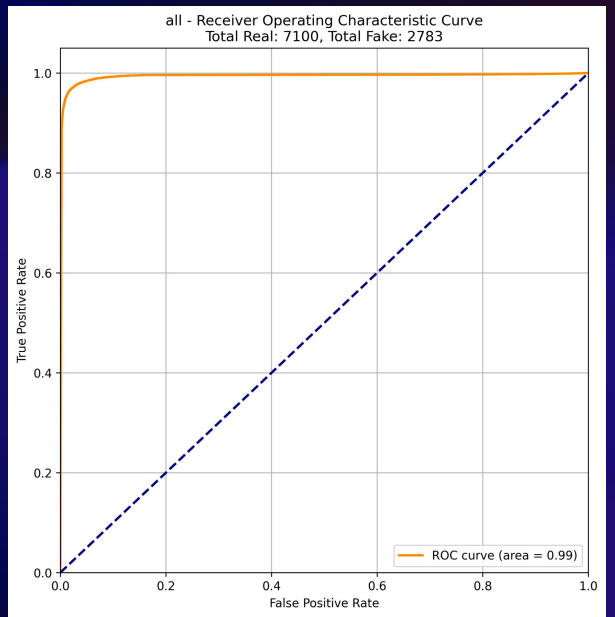


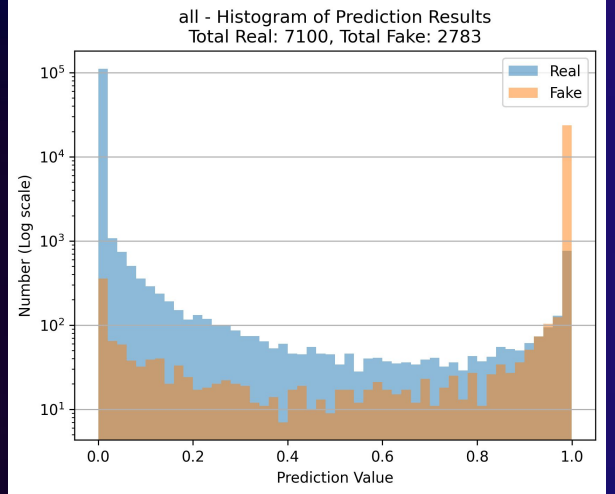




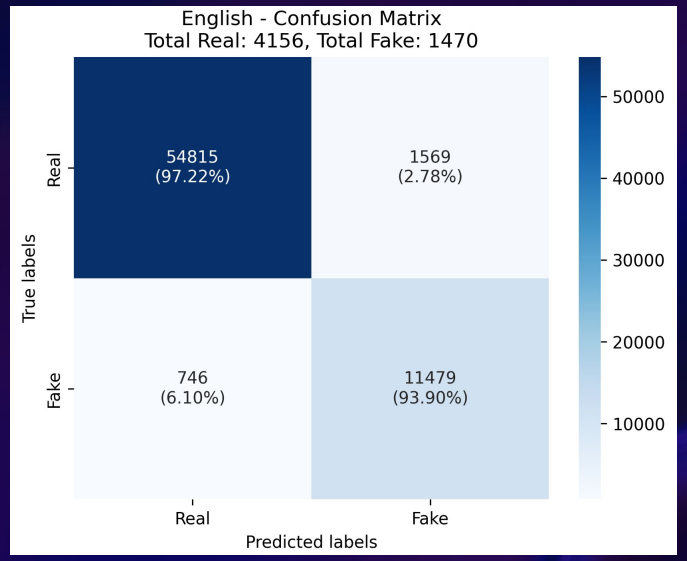
Voice Detection Results - DM-VD-1 Augmented

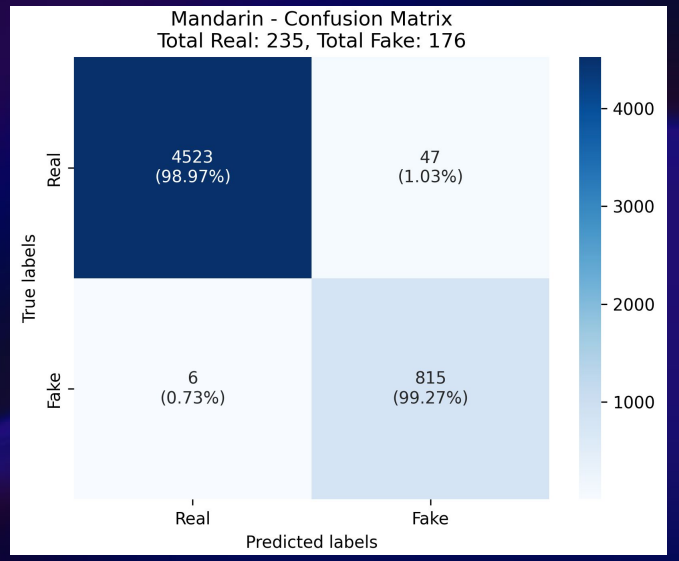


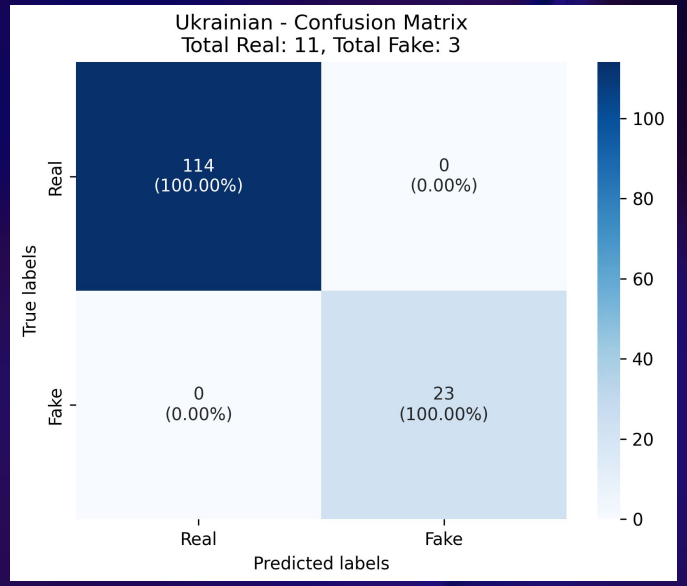


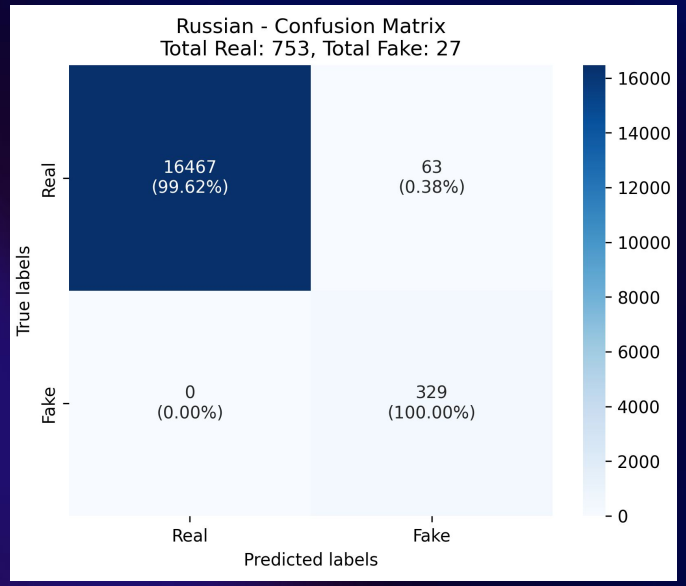


Voice Detection Results - DM-VD-1 Augmented









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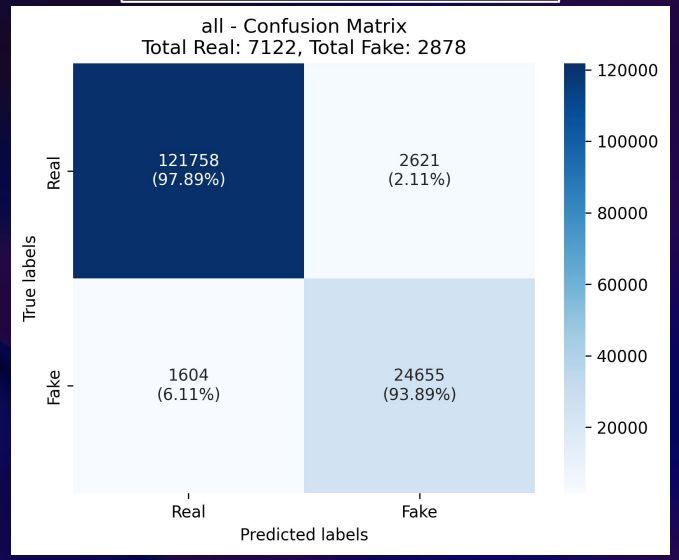
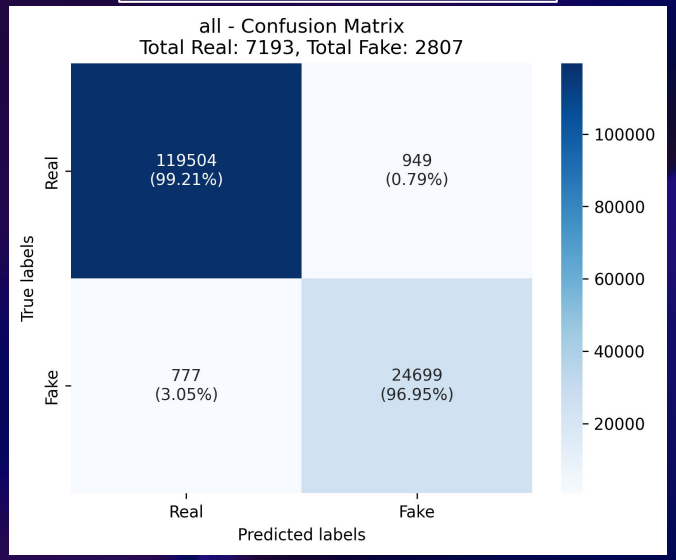
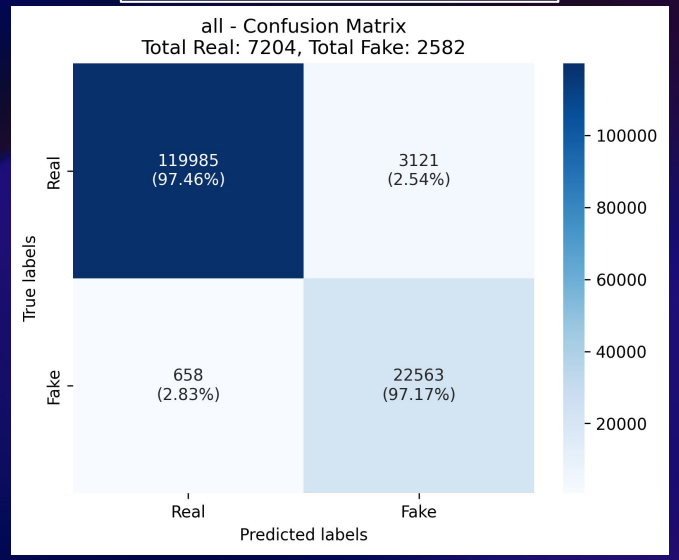
Voice Detection Results - Augmentation Effects

DM-VD-2 | **DM-VD-3** | **DM-VD-1**

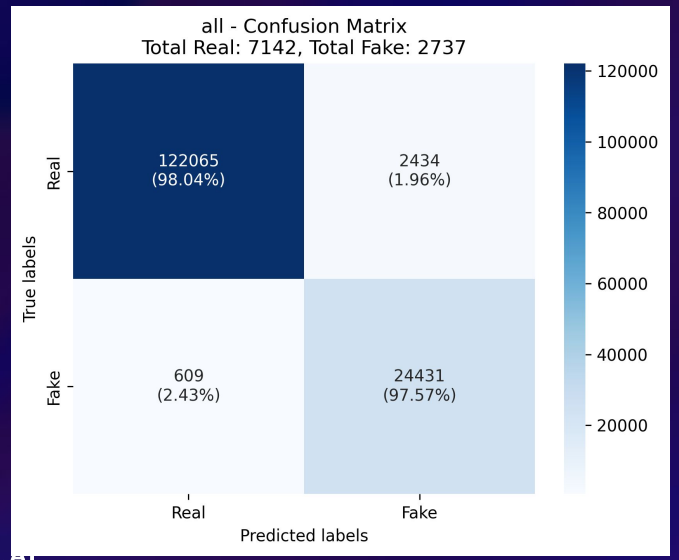
BASE

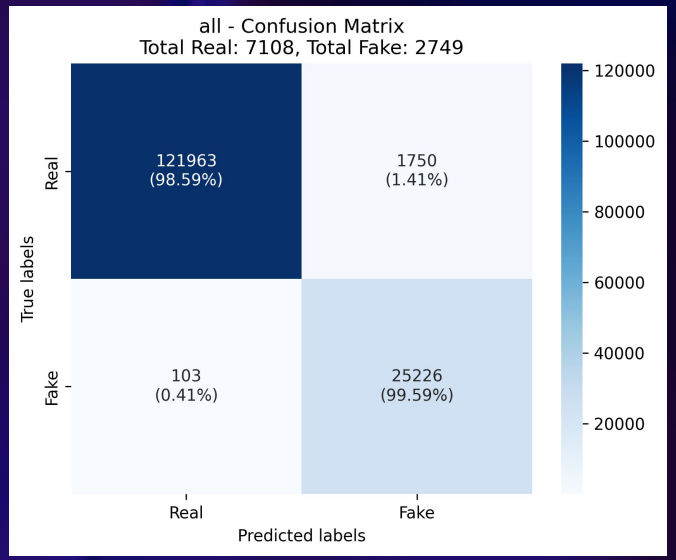


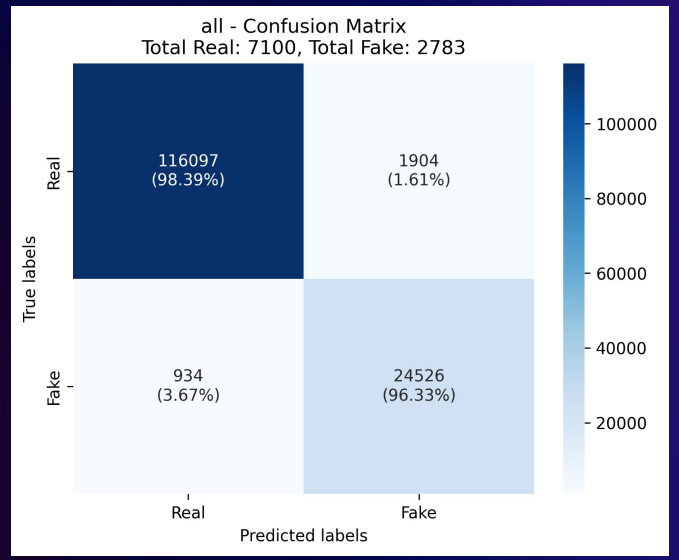




AUGMENTED







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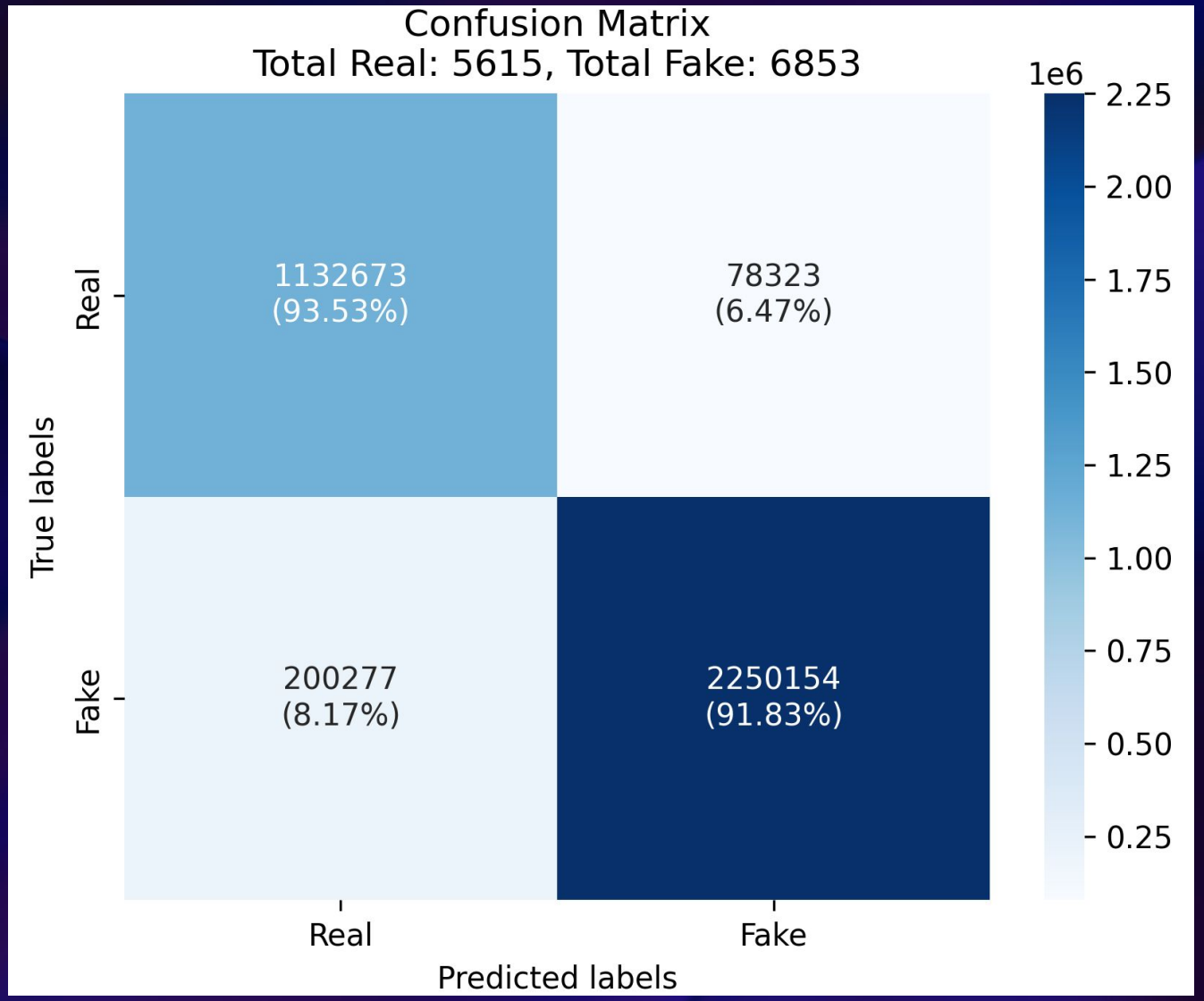
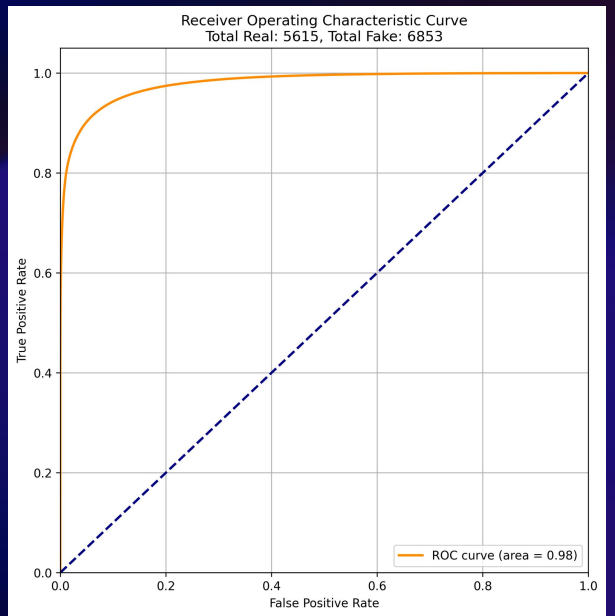
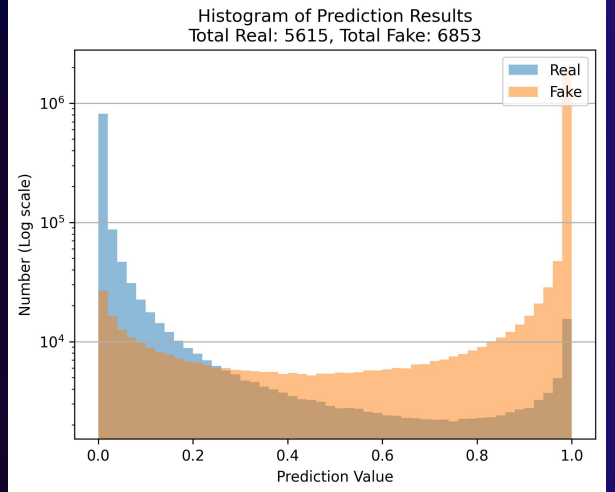
Face Detection Results - DM-FD-1







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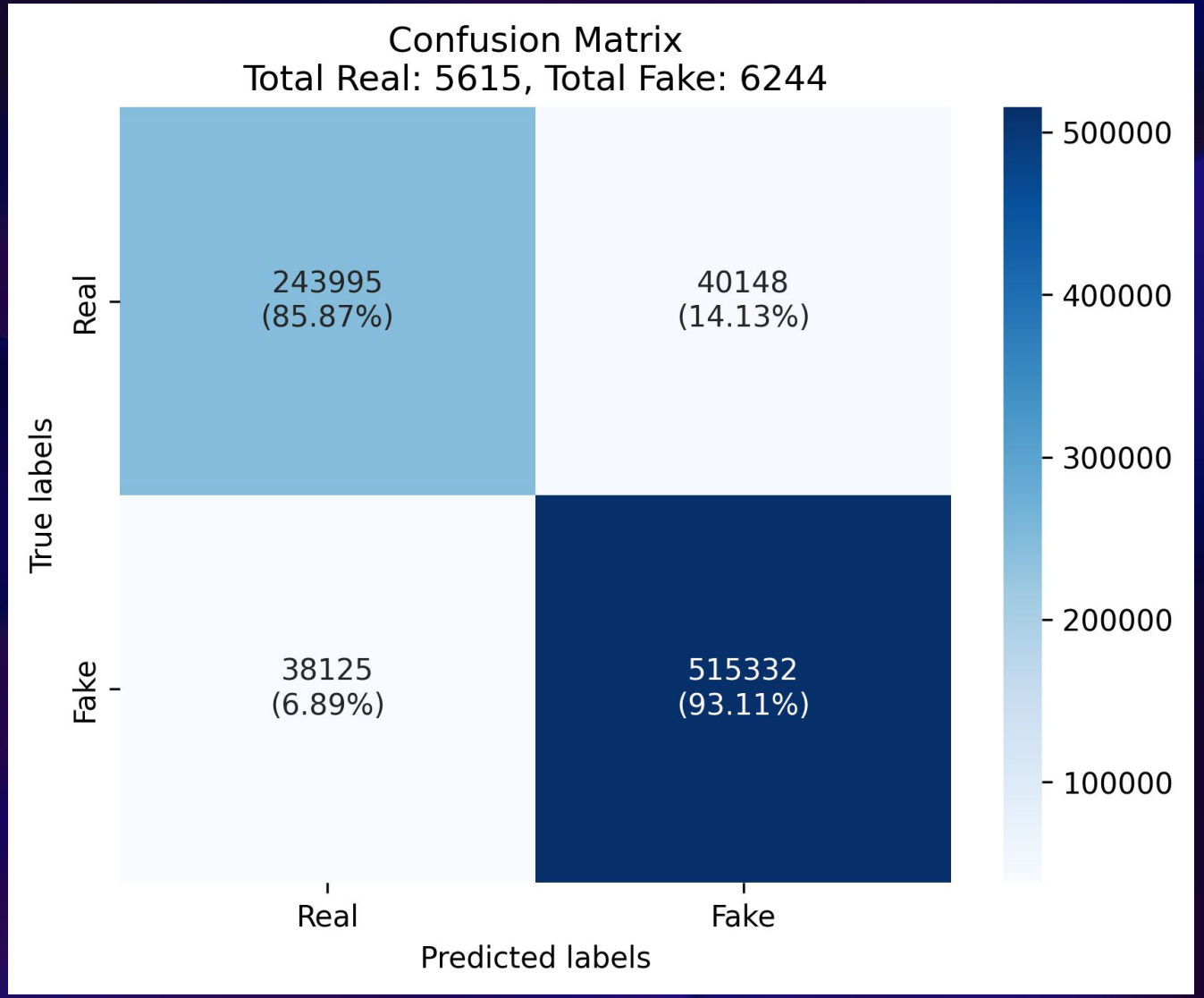
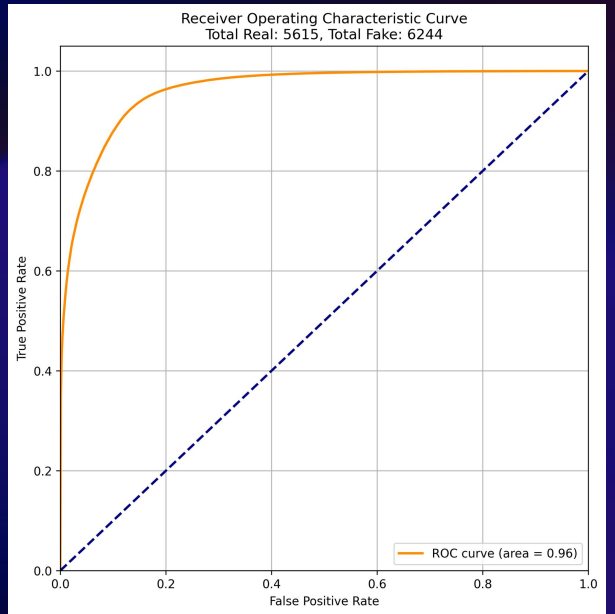
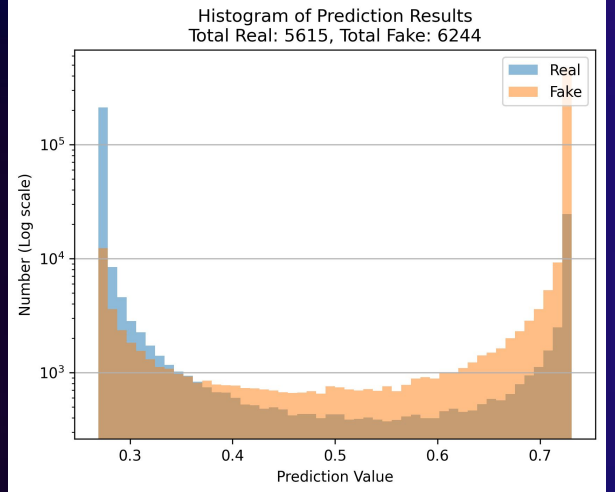
Face Detection Results - DM-FD-2







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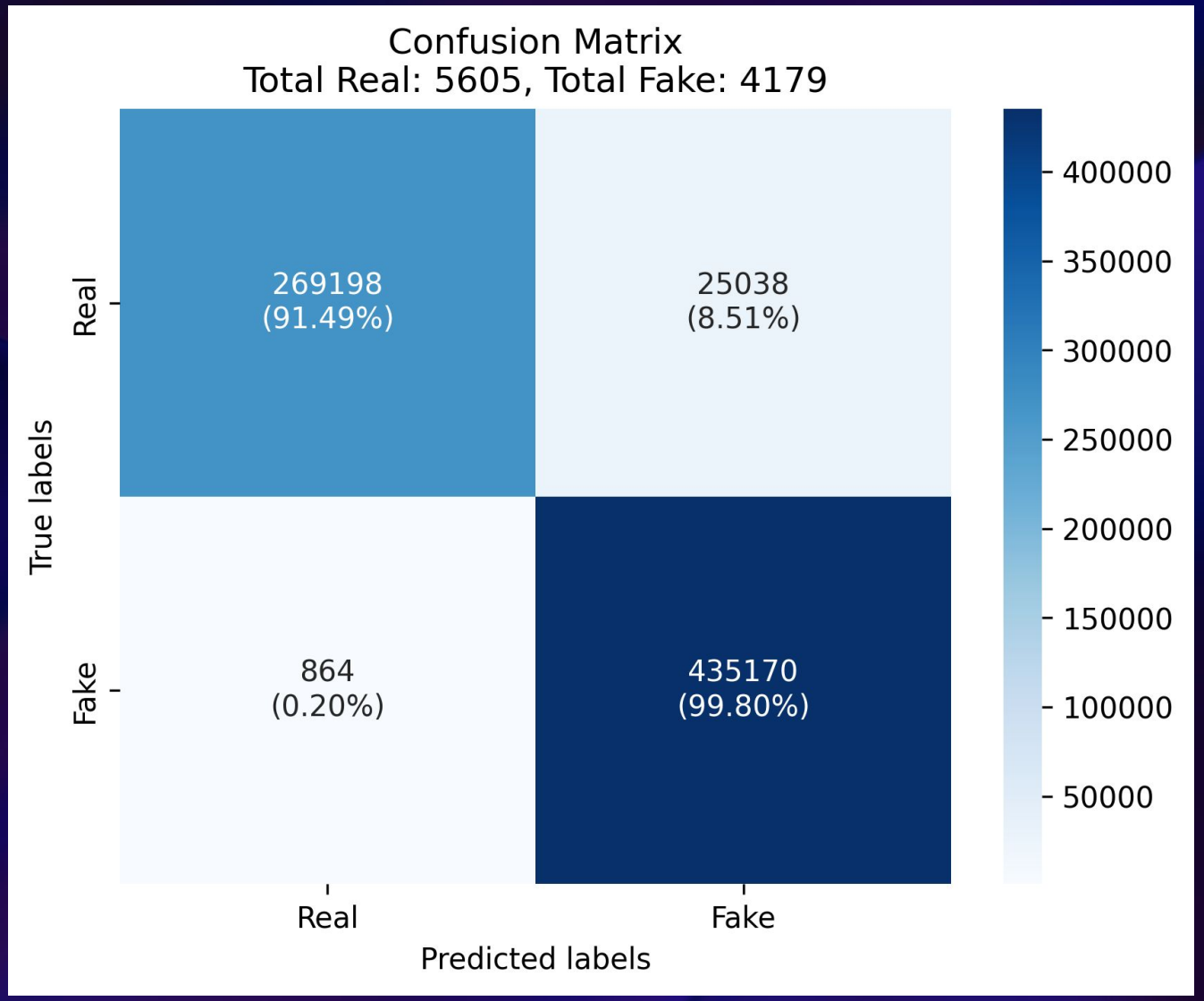
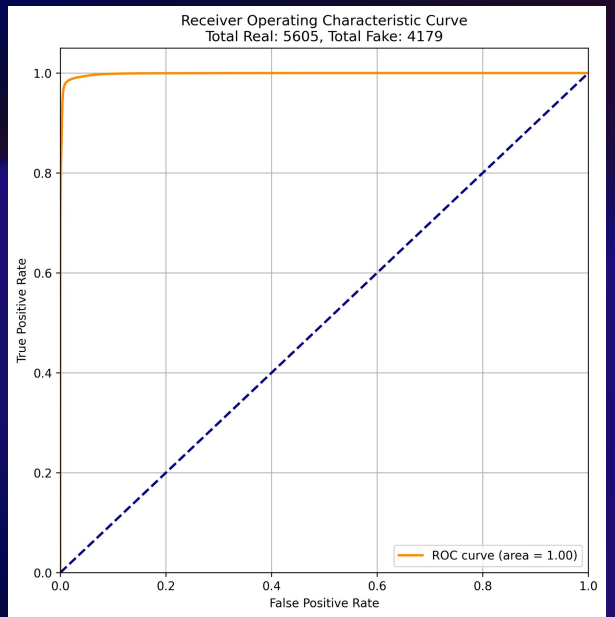
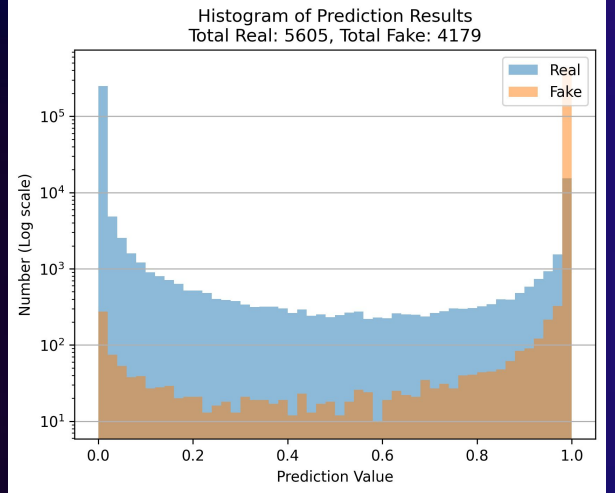
Face Detection Results - DM-FD-3







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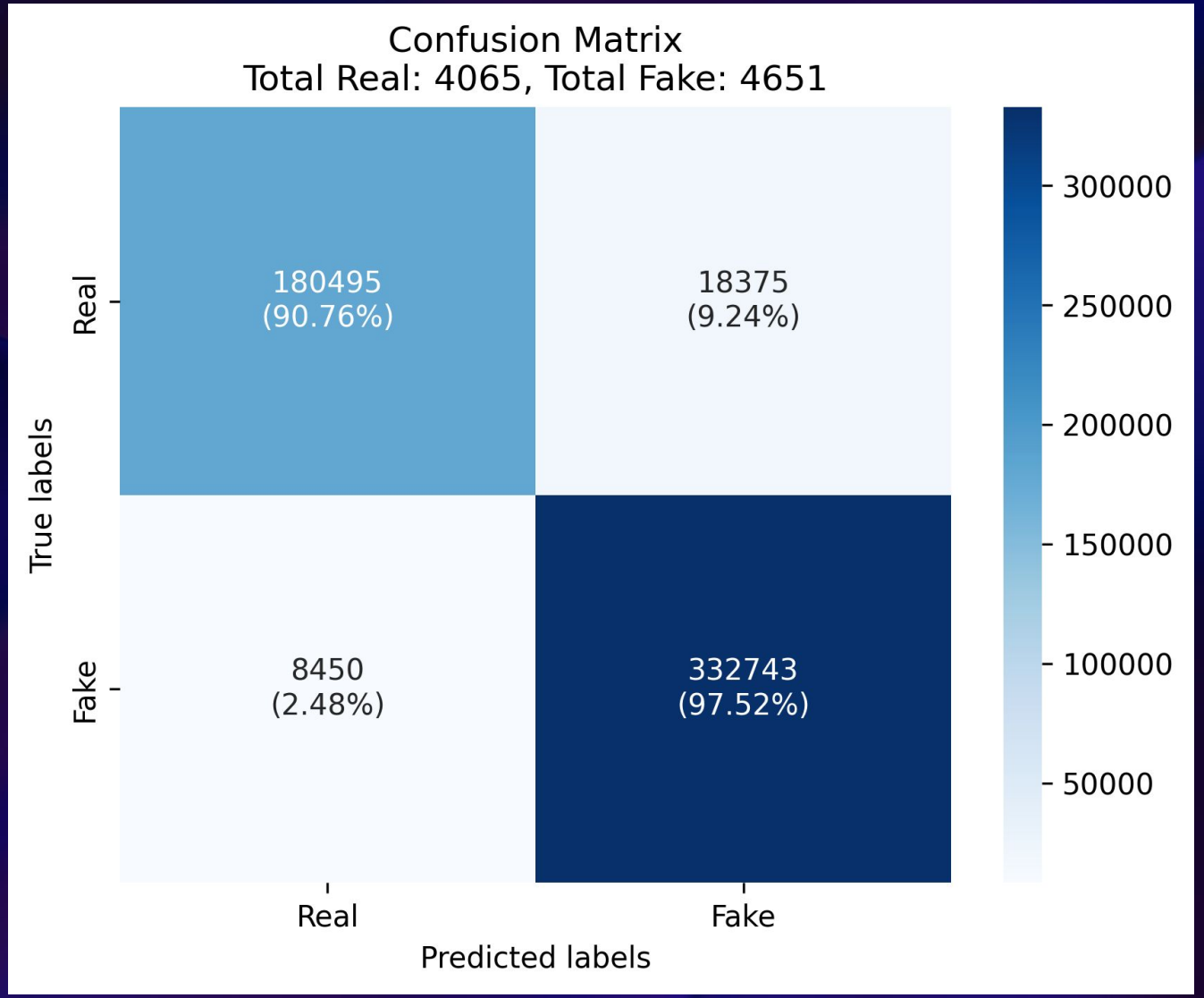
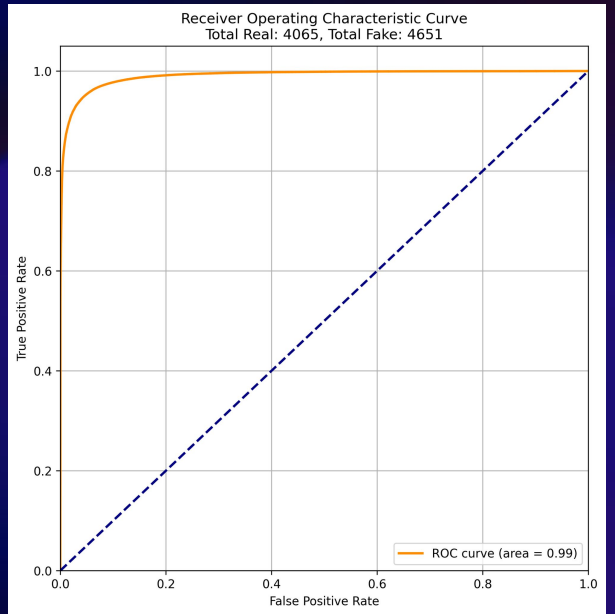
Adding Image/Video Augmentations

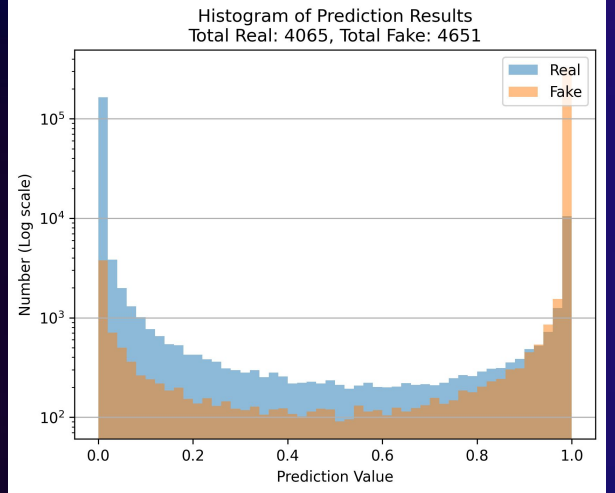
```
augmentation_compose = A.Compose([
            A.ImageCompression(always_apply=False, p=0.10, quality_lower=60, quality_upper=100, compression_ty
            A.HorizontalFlip(p=0.5),
            A.Affine(p=0.10, scale=(0.95, 1.05), translate_percent=(-0.03, 0.03), rotate=(-3, 3), shear=(-3,
            A.ShiftScaleRotate(shift_limit=0.10, scale_limit=0.2, rotate_limit=5, border_mode=cv2.BORDER_REPL
            A.CLAHE(always_apply=False, p=0.10, clip_limit=(1, 4), tile_grid_size=(8, 8)),
            A.HueSaturationValue(always_apply=False, p=0.20, hue_shift_limit=(-20, 20), sat_shift_limit=(-30,
            A.RandomBrightnessContrast(always_apply=False, p=0.20, brightness_limit=(-0.2, 0.2), contrast_lim
            A.ToGray(p=0.05),
            A.GaussNoise(always_apply=False, p=0.10, var_limit=(10.0, 50.0)),
            A.MotionBlur(always_apply=False, p=0.10, blur_limit=(3, 7)),
            A.ImageCompression(always_apply=False, p=0.20, quality_lower=60, quality_upper=100, compression_ty

        ],
        additional_targets=additional_targets_dict
)
```

Face Detection Results - DM-FD-3 w/ Augmentations







Face Detection Results - Effect of Resolution

	128×128	256×256	512×512	1024×1024
DM-FD-1	Confusion Matrix Total Real: 1251, Total Fake: 2082 250196 (85.70%) 41734 (14.30%) 83873 (13.69%) 528820 (86.31%)	Confusion Matrix Total Real: 2060, Total Fake: 2646 408387 (92.60%) 32638 (7.40%) 95034 (12.30%) 677641 (87.70%)	Confusion Matrix Total Real: 1917, Total Fake: 2119 391752 (99.05%) 3747 (0.95%) 20937 (1.97%) 1042705 (98.03%)	Confusion Matrix Total Real: 378, Total Fake: 6 80474 (99.76%) 192 (0.24%) 433 (30.47%) 988 (69.53%)
DM-FD-2	Confusion Matrix Total Real: 1251, Total Fake: 1867 50415 (73.16%) 18495 (26.84%) 17995 (13.65%) 113844 (86.35%)	Confusion Matrix Total Real: 2060, Total Fake: 2314 84415 (81.58%) 19066 (18.42%) 17194 (10.37%) 148577 (89.63%)	Confusion Matrix Total Real: 1917, Total Fake: 2058 89938 (97.31%) 2484 (2.69%) 2893 (1.13%) 252666 (98.87%)	Confusion Matrix Total Real: 378, Total Fake: 5 18788 (99.45%) 103 (0.55%) 43 (14.93%) 245 (85.07%)
DM-FD-3	Confusion Matrix Total Real: 1249, Total Fake: 892 57216 (80.41%) 13936 (19.59%) 511 (0.66%) 76782 (99.34%)	Confusion Matrix Total Real: 2052, Total Fake: 1325 96632 (90.54%) 10092 (9.46%) 202 (0.20%) 102717 (99.80%)	Confusion Matrix Total Real: 1917, Total Fake: 1959 95265 (98.97%) 991 (1.03%) 151 (0.06%) 255444 (99.94%)	Confusion Matrix Total Real: 378, Total Fake: 3 19629 (99.91%) 18 (0.09%) 0 (0.00%) 227 (100.00%)
DM-FD-3 Aug	Confusion Matrix Total Real: 1216, Total Fake: 1862 57989 (84.49%) 10643 (15.51%) 4014 (2.97%) 130967 (97.03%)	Confusion Matrix Total Real: 1932, Total Fake: 2218 89693 (92.31%) 7473 (7.69%) 3690 (2.39%) 150666 (97.61%)	Confusion Matrix Total Real: 763, Total Fake: 566 27584 (99.07%) 259 (0.93%) 715 (1.39%) 50876 (98.61%)	Confusion Matrix Total Real: 154, Total Fake: 5 5229 (100.00%) 0 (0.00%) 31 (11.70%) 234 (88.30%)

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Conclusions

Textual Deepfake Detection Challenges: Pioneering advancements in techniques and detection algorithms are paramount to surmount the substantial challenges posed by high-accuracy deepfake text detection. This uncharted territory beckons for revolutionary tools and methodologies to bolster detection precision.

A Triumph in Voice Authentication: Current voice detection methodologies exhibit stellar performance even amidst intricate augmentations. There's no pressing need for reinvention; instead, fortifying our existing models with richer and more diverse data will propel their efficacy to unparalleled heights.

Facial Deepfake Recognition: Not only does our facial detection stand robust in its primary implementation, but it also showcases admirable resilience against various augmentations. An intriguing discovery across models underscores the potential power of an ensemble strategy as the key to fortifying deepfake countermeasures.

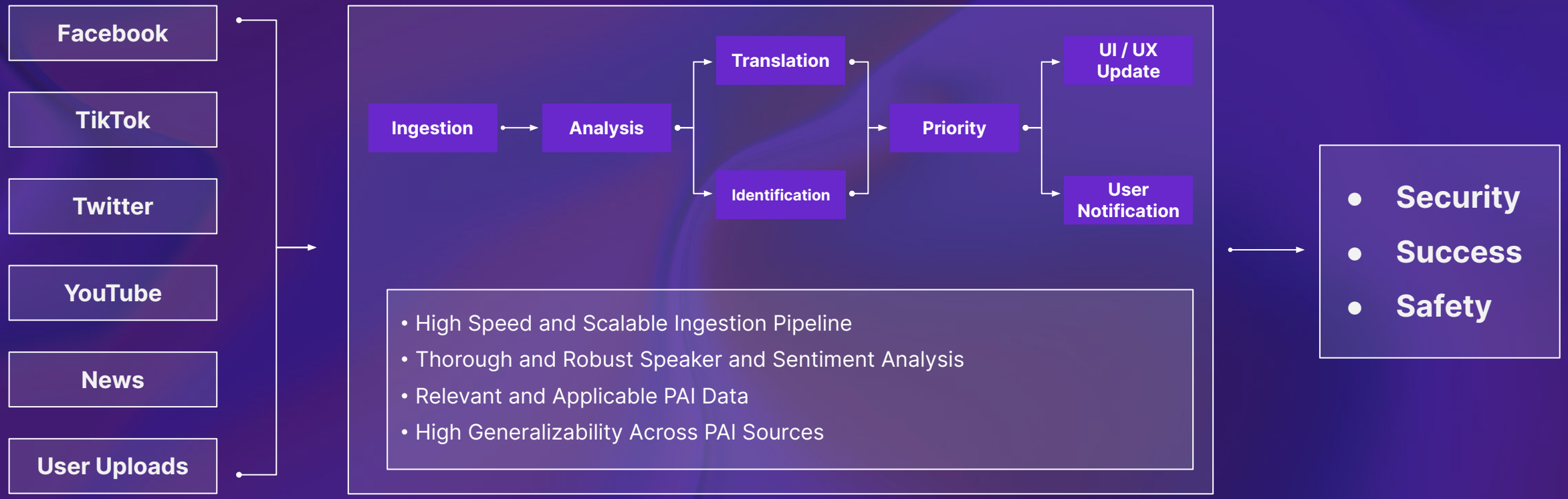
Catalyzing Enhanced Detection: To achieve apex detection accuracies spanning all modalities, it's imperative to craft and assimilate datasets enriched with data derived from avant-garde generator types. These datasets, when seamlessly integrated into our training conduits, promise to redefine the gold standard of deepfake detection.

Pioneering Future Research Frontiers: Venturing deeper into the realms of detector architectures, avant-garde training modalities, and sophisticated feature extraction layers holds the promise to elevate detection accuracy, especially in nuanced scenarios like those presented by ultra-low resolutions.

Big Picture

Empowering DoD and IC Media Intelligence and AI Forensics at Scale

We Harness PAI sources for Robust Data Intake and Analysis at Scale, Processing Millions of Videos Per Day at a Cost of $0.005 / Min



Synthetic Media Detection Process: Face and Voice Acquisition

DeepMedia’s video ingestion process prepares ingested content for further analysis and processing. DeepMedia's proprietary pre-processing technique aims to optimize the input media for various AI models used in the product. For video content, it is split into individual frames, and the audio is extracted from the video stream. If the input is audio, it is directly processed. Our sophisticated pre-processing detects and extracts faces and voices from the ingested content, preparing them for processing through our state of the art Deepfake Detectors.

Step 1

DeepMedia’s Ingestion pipeline stores the ingested content.

Step 2

Video Content is split into frames, and audio extracted from the video

Step 3

Faces and voices are detected and stored from the inputted content.

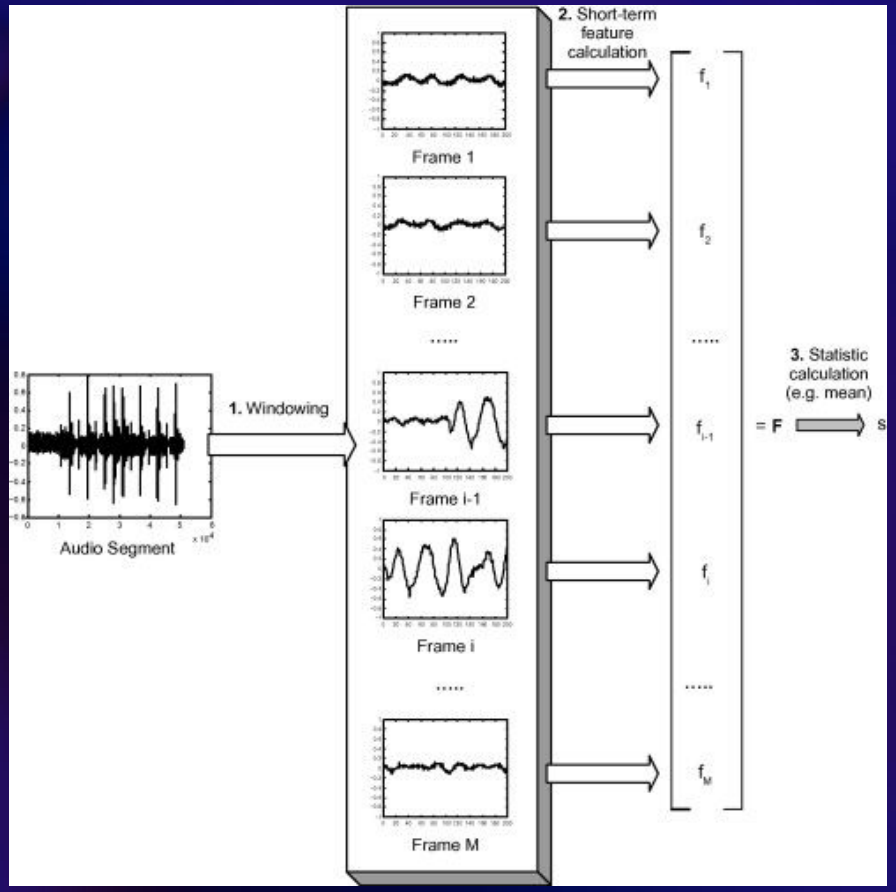
Step 4

These faces and voices are prepared for processing through our deepfake detectors.

AI Media Detection Process: Face and Voice Acquisition

For Instance, consider the Hillary Clinton Deepfake Outlined Previously:

The DeepID System first hones in on any faces of interest, and splits the video into frames. And audio is collected through a process known as feature extraction, illustrated below.



AI Media Detection Process: Transcription and Translation

To generate transcripts for the ingested content and identify each individual, we utilize a multi-modal deep learning approach. The audio from the input media is transcribed using a state-of-the-art Automatic Speech Recognition (ASR) model, capturing the spoken words. Simultaneously, the face detection and recognition models identify and track individuals in the video frames. The detected faces are associated with the transcribed speech to assign spoken words to specific individuals accurately.

Furthermore, the optional translation to English is performed by employing a Transformer-based Machine Translation model, converting the transcribed text from the original language to English. This multi-modal process ensures comprehensive and contextually accurate transcripts that attribute spoken words to the correct individuals while providing the flexibility to translate the content to English if desired.

Step 1

Audio is transcribed using a state-of-the-art Automatic Speech Recognition Model.

Step 2

Face Detection models identify and track individuals in the video.

Step 3

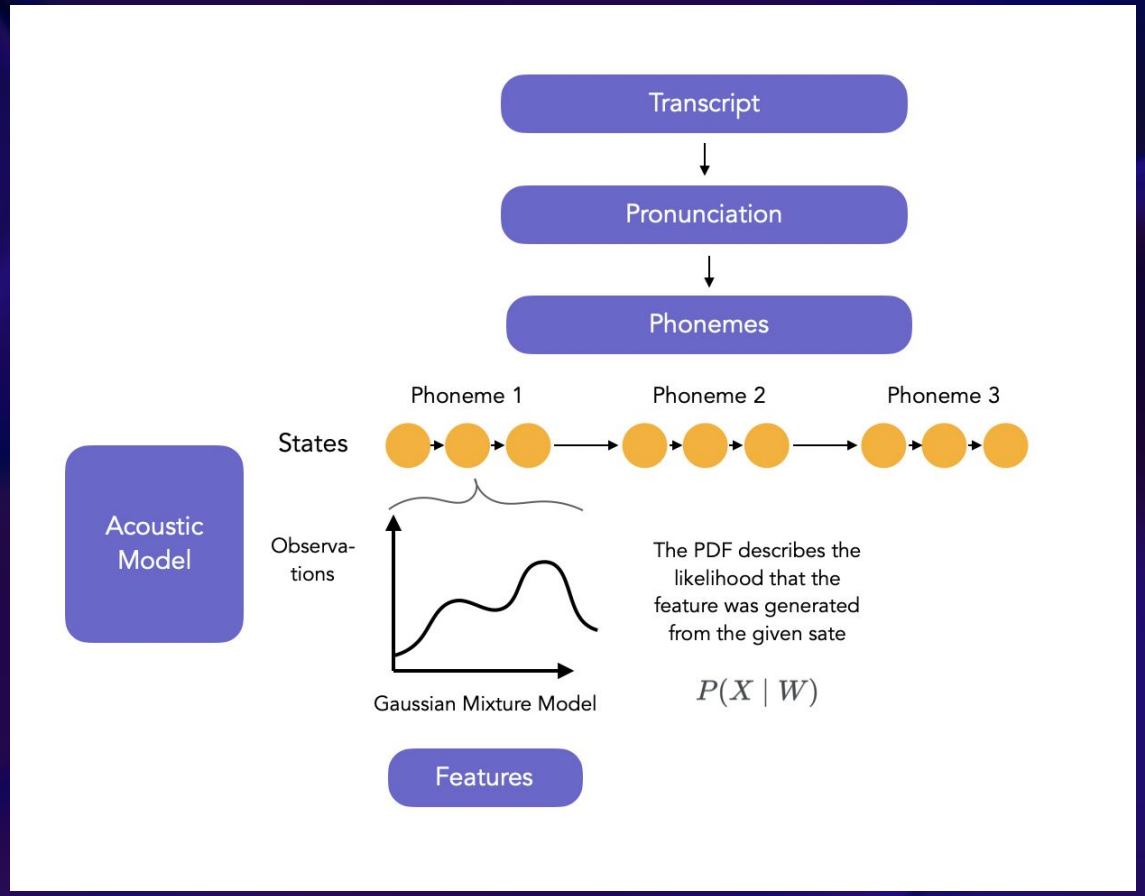
Detected Faces are automatically associated with the transcribed speech.

Step 4

When desired, translation to English is performed by a powerful Transformer based Machine Translation Model, converting the transcribed text to English.

AI Media Detection Process: Transcription and Translation

The video is then passed through Deep Media's state-of-the-art Automatic Speech Recognition Model, which accurately detects and transcribes the provided audio, using a powerful phoneme analysis. When desired, this transcription is passed through a transformer model and ito any language of interest.



"You know, people might be surprised to hear me saying this, but I actually like Ron DeSantis a lot. Yeah, I know. I'd say he's just the kind of guy this country needs, and I really mean that. If Ron DeSantis got installed as president, I'd be fine with that."

- Hillary Clinton in AI-Generated Video

AI Media Detection Process: Face and Voice Analysis

Our voice and face deepfake detectors employ advanced deep learning techniques to scrutinize the extracted faces and voices and discern any signs of synthetic manipulation. For face deepfake detection, the model scrutinizes facial landmarks, micro-expressions, and overall facial consistency to identify potential anomalies. Additionally, the model analyzes artifacts, inconsistencies, and unnatural movements to distinguish real faces from manipulated ones. For voice deepfake detection, the model examines spectrograms, pitch patterns, and phonetic characteristics, scrutinizing any inconsistencies or patterns characteristic of synthetic speech generated by voice synthesis models. Moreover, both detectors utilize large-scale datasets of genuine and manipulated faces and voices for robust training, enabling them to adapt and recognize emerging deepfake techniques effectively.

Step 1

Using a robust and extensive Deepfake and real dataset, our detector analyzes each face and voice for signs of manipulation

Step 2

Faces are analyzed for micro-expressions and facial consistency

Step 3

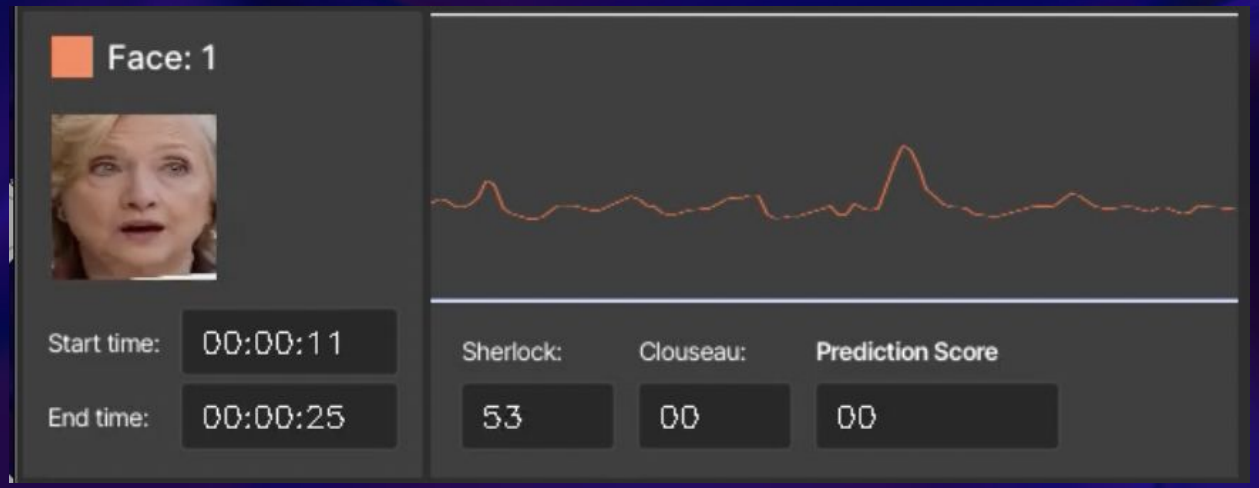
DeepID identifies artifacts, inconsistencies and unnatural movements to distinguish real and manipulated faces

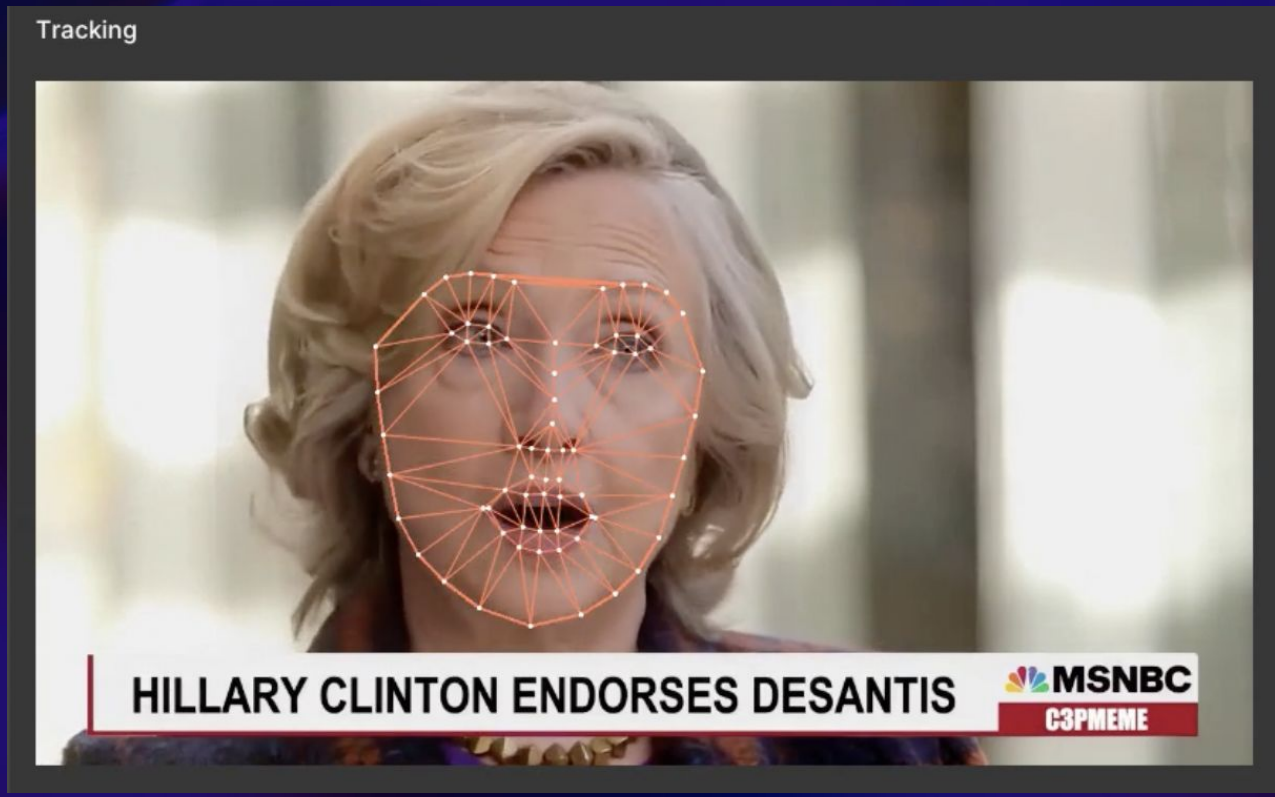
Step 4

Voices are examined for pitch patterns and phonetic characteristics.

AI Media Detection Process: Face and Voice Analysis

The extracted frames are analyzed by our world class detectors, and a real time video analysis is performed. Below you can observe our Sherlock detector analyzing this input, as well as our Facial Tracking system, which ensures our detectors have the highest accuracies possible.





AI Media Creation Process: Multi-Modal Ensemble Detection

After analyzing the extracted faces and voices using our voice and face deepfake detectors, we merge the results to form a comprehensive assessment of the content's authenticity. By comparing the identified faces with our people identification database, we determine the presence of known individuals and potential impersonations. Our proprietary fusion algorithm combines the outputs from multiple detectors, considering their respective confidences, to arrive at a reliable final verdict on whether the content is likely manipulated or genuine. The synthesized findings are presented in a user-friendly report, outlining the level of confidence in the detection results

Step 1

We merge the results from our face and voice analysis to come to a conclusion about the authenticity of the content.

Step 2

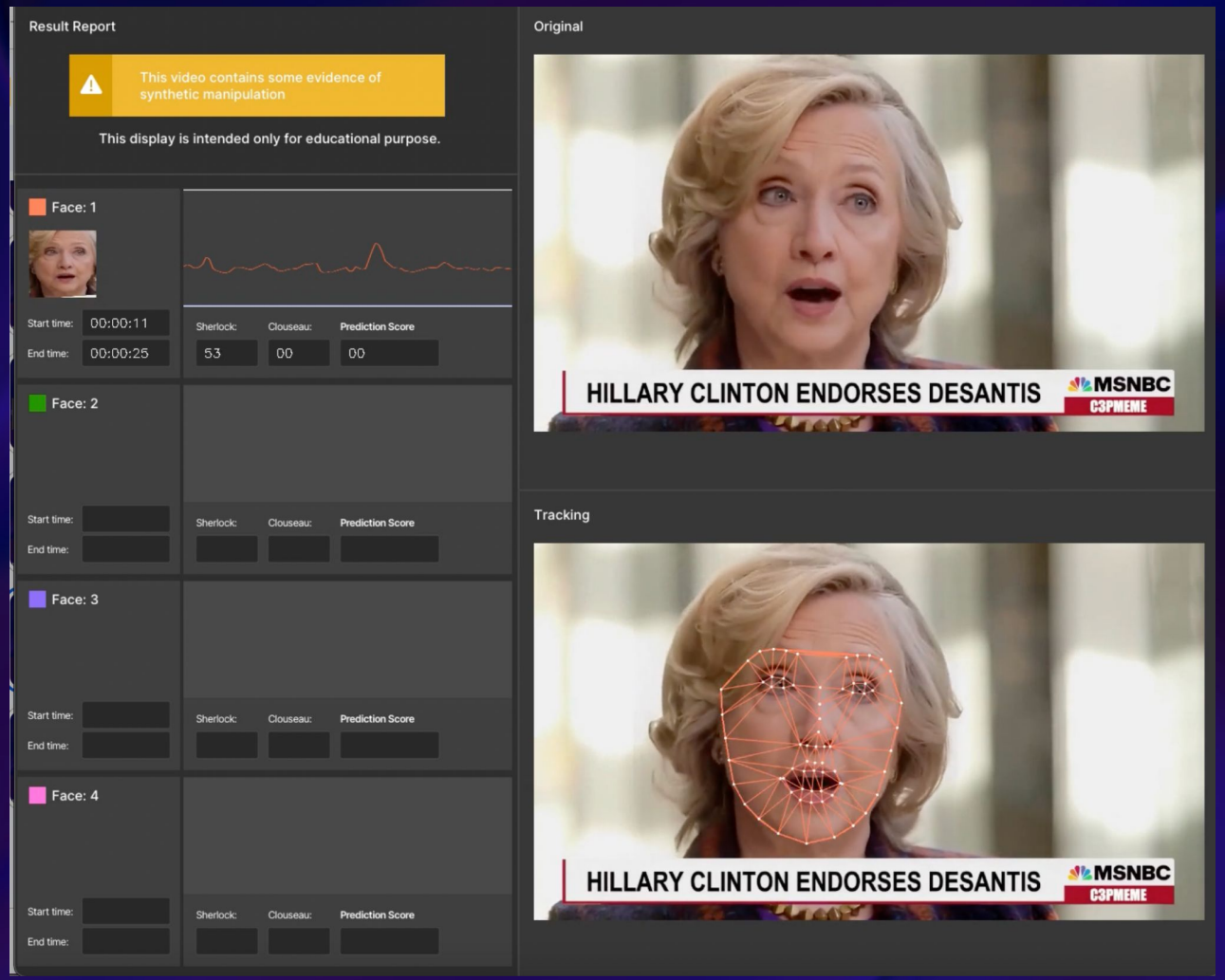
We combine the output of multiple detectors to ensure an accurate conclusion about the authenticity of the content.

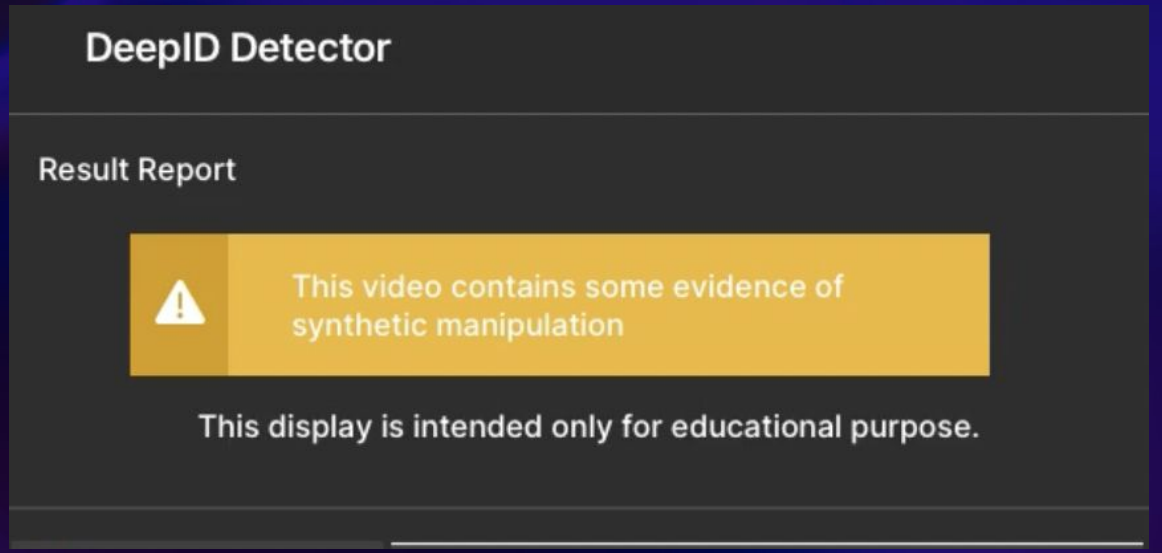
Step 3

We arrive at a final conclusion, and prepare a user friendly report outlining our confidence in the detection results.

AI Media Creation Process: Multi-Modal Ensemble Detection

Implementing an extensively tested set of Heuristics to determine the authenticity of the inputted content, a conclusion is drawn by our detectors. Our system provides analysis of the authenticity of both Audio and Video





AI Media Detection Process: Translation, Sentiment Analysis, Identity Detection, and Prioritization

Prioritizing and delivering information to the user is a crucial aspect of our product's user experience. We follow a streamlined approach to ensure efficient and clear communication of the analysis results. First, the deepfake detection and people identification results are prioritized based on their confidence levels, highlighting the most relevant and critical findings. The user is presented with a summary of the key insights, such as whether deepfake manipulation is detected and if any identified individuals warrant special attention.

Step 1

Deepfake detection results are prioritized based upon their confidence level

Step 2

The user is presented with a summary of the key insights uncovered by the detection process

Step 3

A detailed report is provided, offering a comprehensive breakdown of the analysis, including timestamps of potential manipulation occurrences, transcribed text, and identified individuals.

The Lookup Database Utilizes the ARWEAVE Blockchain for Enhanced Security and Reliability

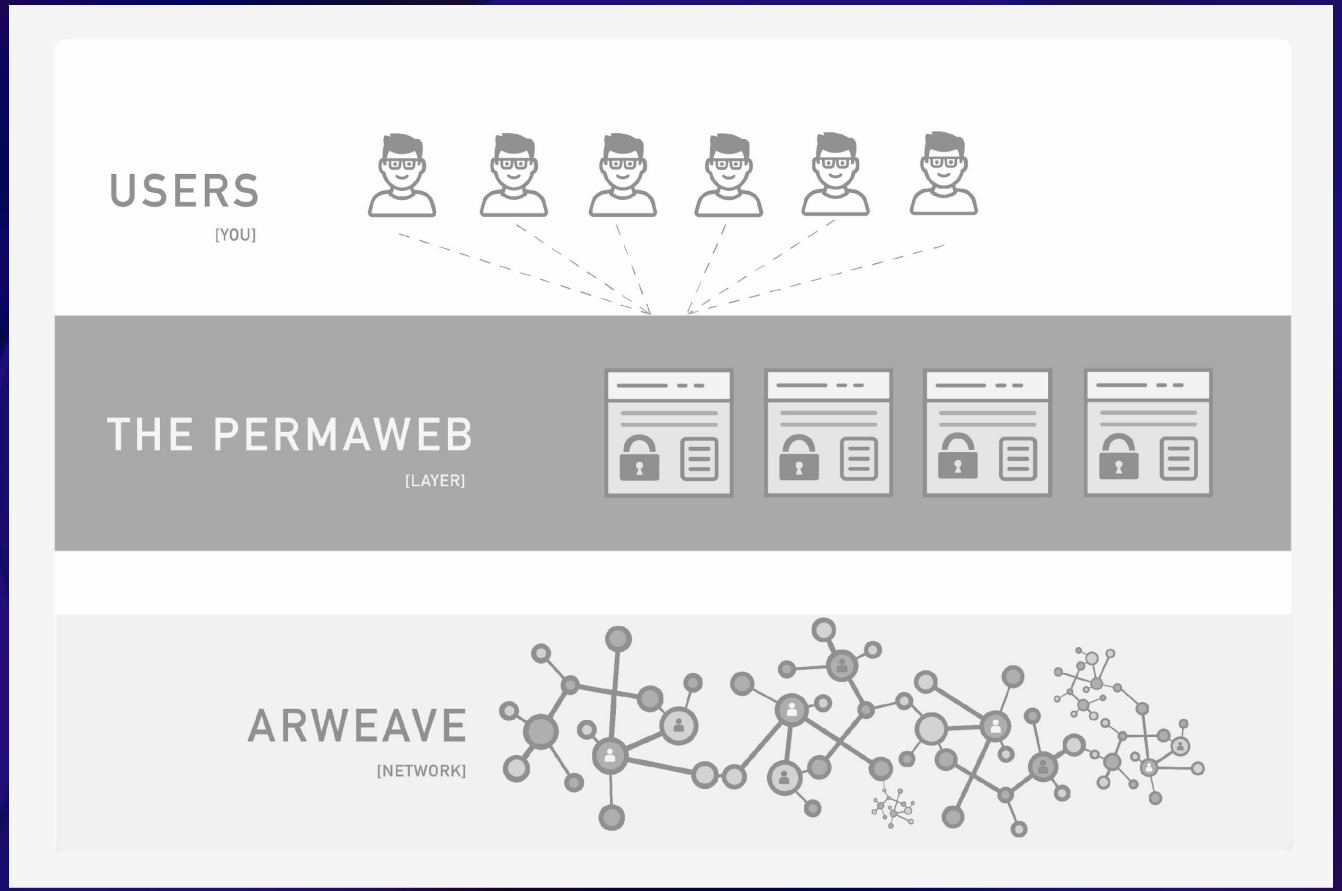
Secure blockchain integration enhances security and reliability for the lookup database

Immutable data records ensures tamper-proof and auditable data in the lookup database

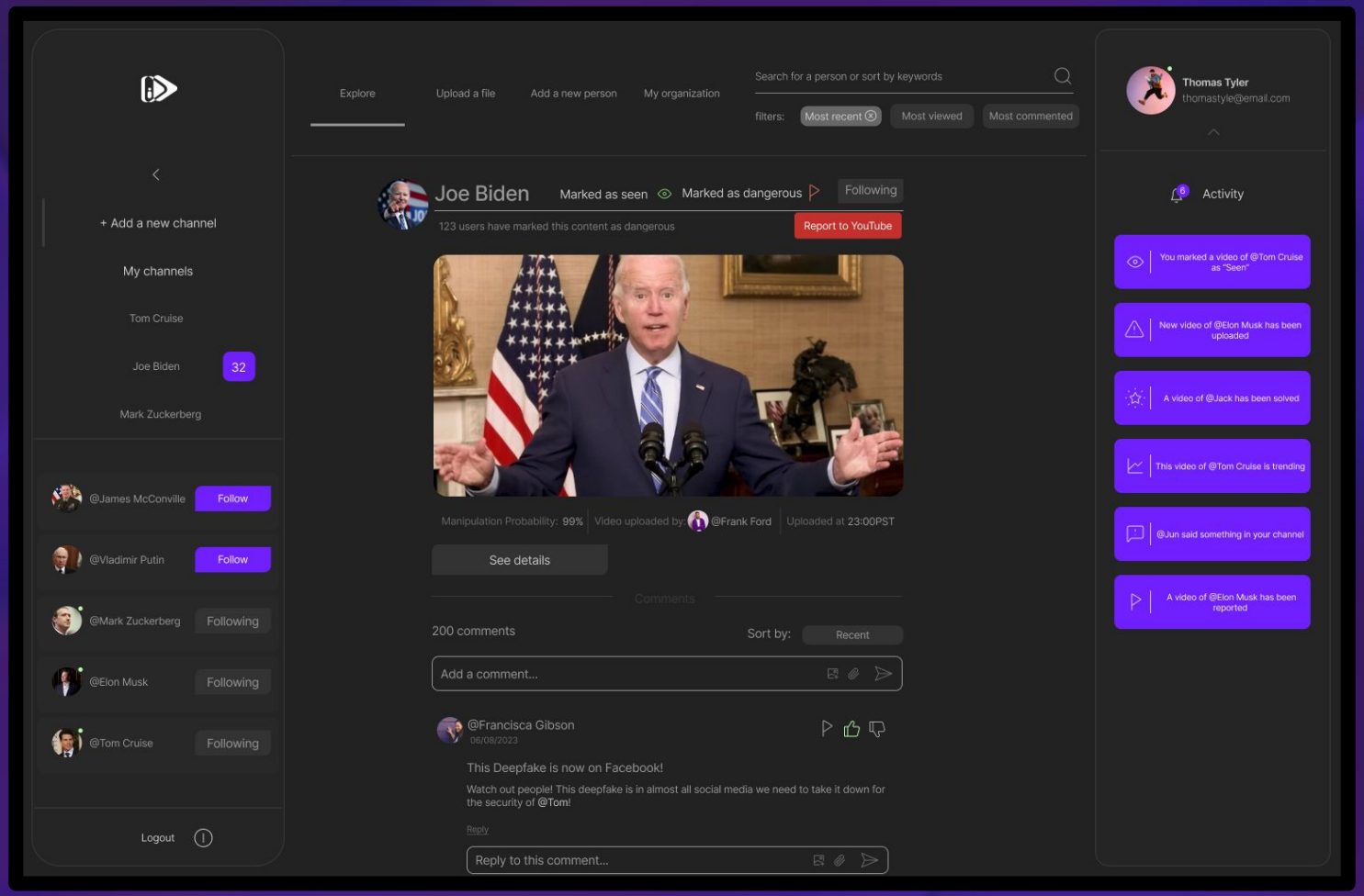
Decentralized architecture increases resilience and availability

Trusted data integrity preventing unauthorized modifications in the lookup database

Reliable and auditable source of information for the lookup database

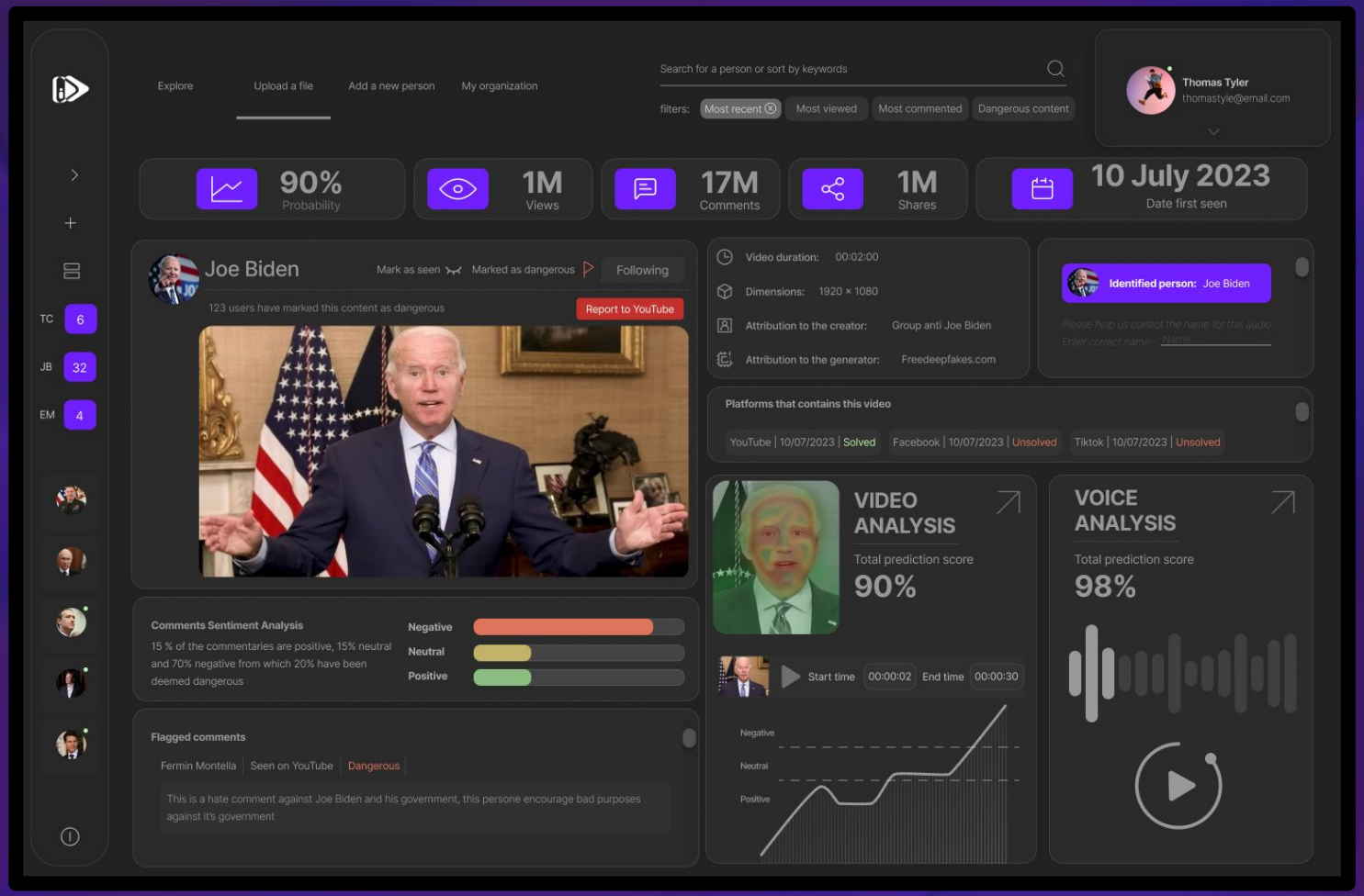


Data Organization, Fast Search, and Workflow Tooling Makes Checking Content Easier and Faster



- Ordered By ThreatLevel
- Fast and Accurate Search
- Easy-to-use Data Feed
- Organizes All Modalities

High-End Analytical features Will Give DoD/IC Supreme Confidence In AI-Security Decisions

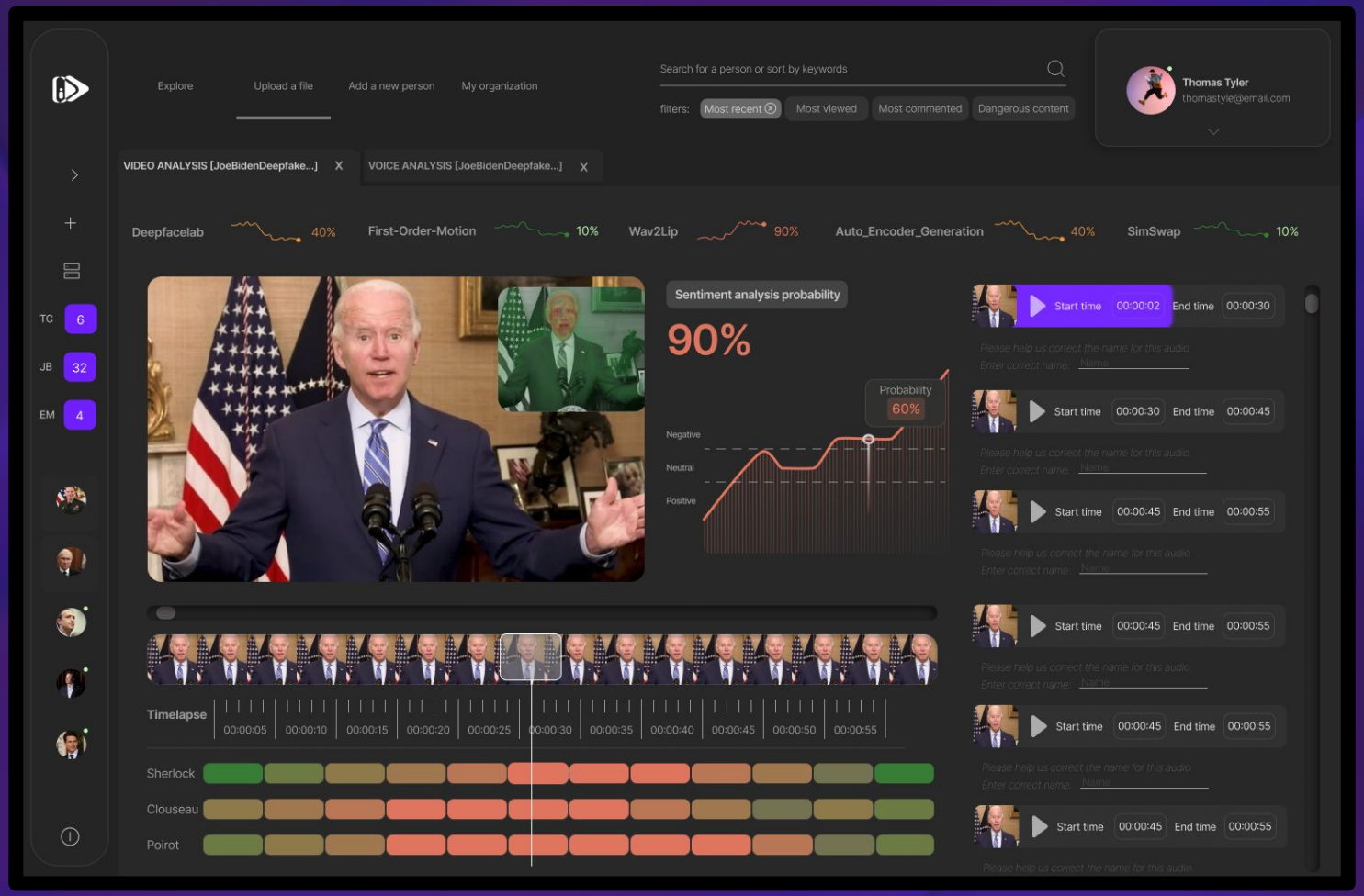


- Overview Stats
- Seamless UI/UX
- Sentiment Analysis
- Meta Data Analysis

Voice Detection, Model Attribution Transcription and Translation

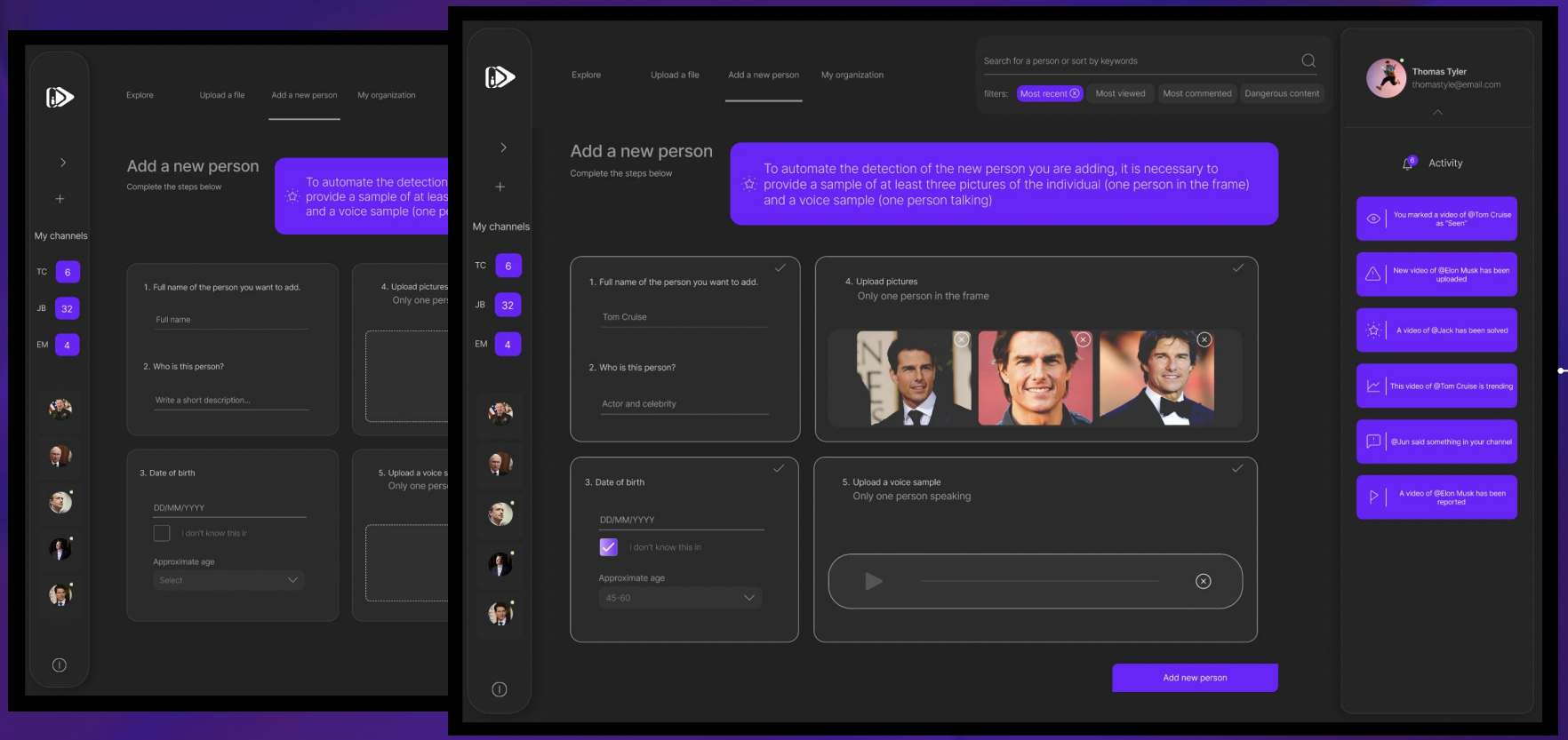
- Voice Detection
- Multiple Detectors
- Text Transcripts
- English Translation

High-Accuracy Facial Manipulation Analysis with Time-Code Organization



- Face Detection
- Generator Attribution
- Trajectory Analysis
- Frame-by-Frame

Face and Voice Identity Mapping for High-Priority Individuals and Alerts



- Easy Update
- User Specific
- Instance Results
- Updates Priority

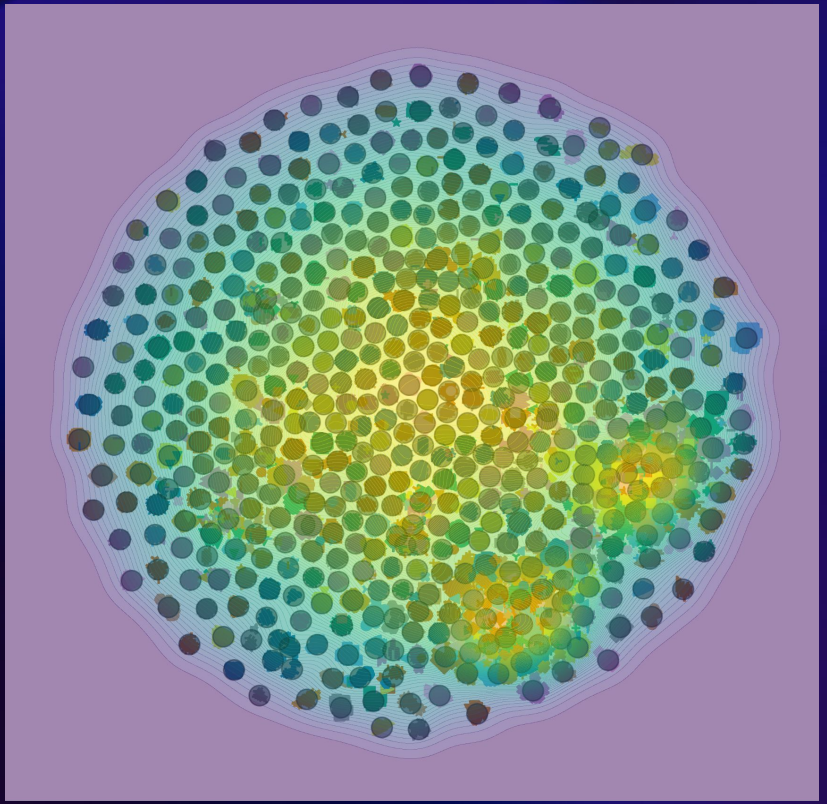
What makes DeepID Different?

Superior Detection: DeepMedia's DeepID outperforms competitors with its robust dataset from 20+ countries and 15+ languages, ensuring unmatched detection in all scenarios, particularly high-risk security situations.

Efficiency Meets Scalability: DeepID isn't just scalable—it's also cost-effective, providing a marked contrast to competitors' resource-intensive solutions.

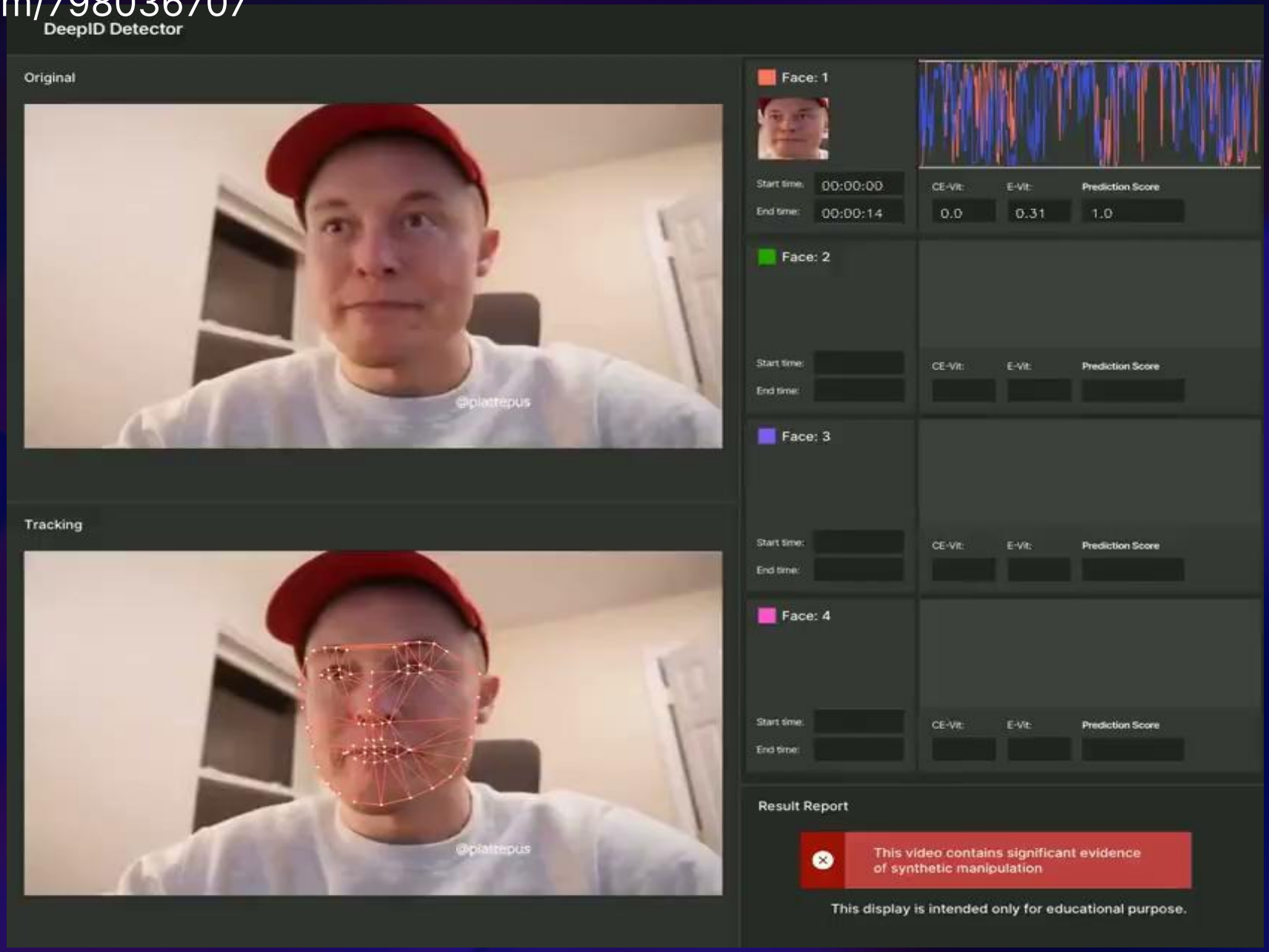
Evolutionary Dataset Excellence: Our dataset is a living entity, ever-evolving and incorporating examples from even the most cutting-edge synthetic manipulation models.

Advanced Interface & Insights: DeepID's intuitive UI and sophisticated visual analytics provide experts with profound insights, enhancing both user experience and security outcomes.



https://vimeo.com/798036678

https://vimeo.com/798036707



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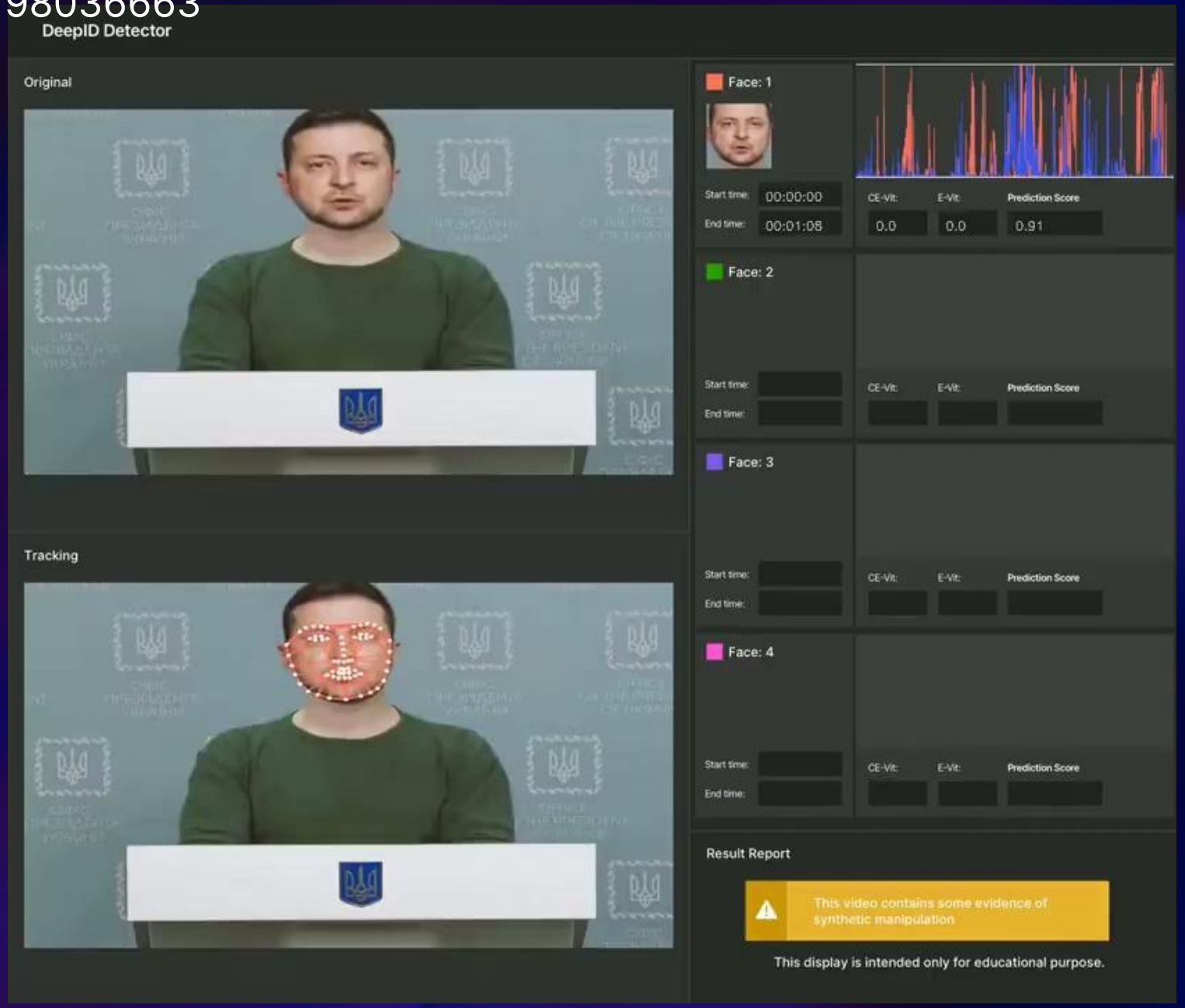


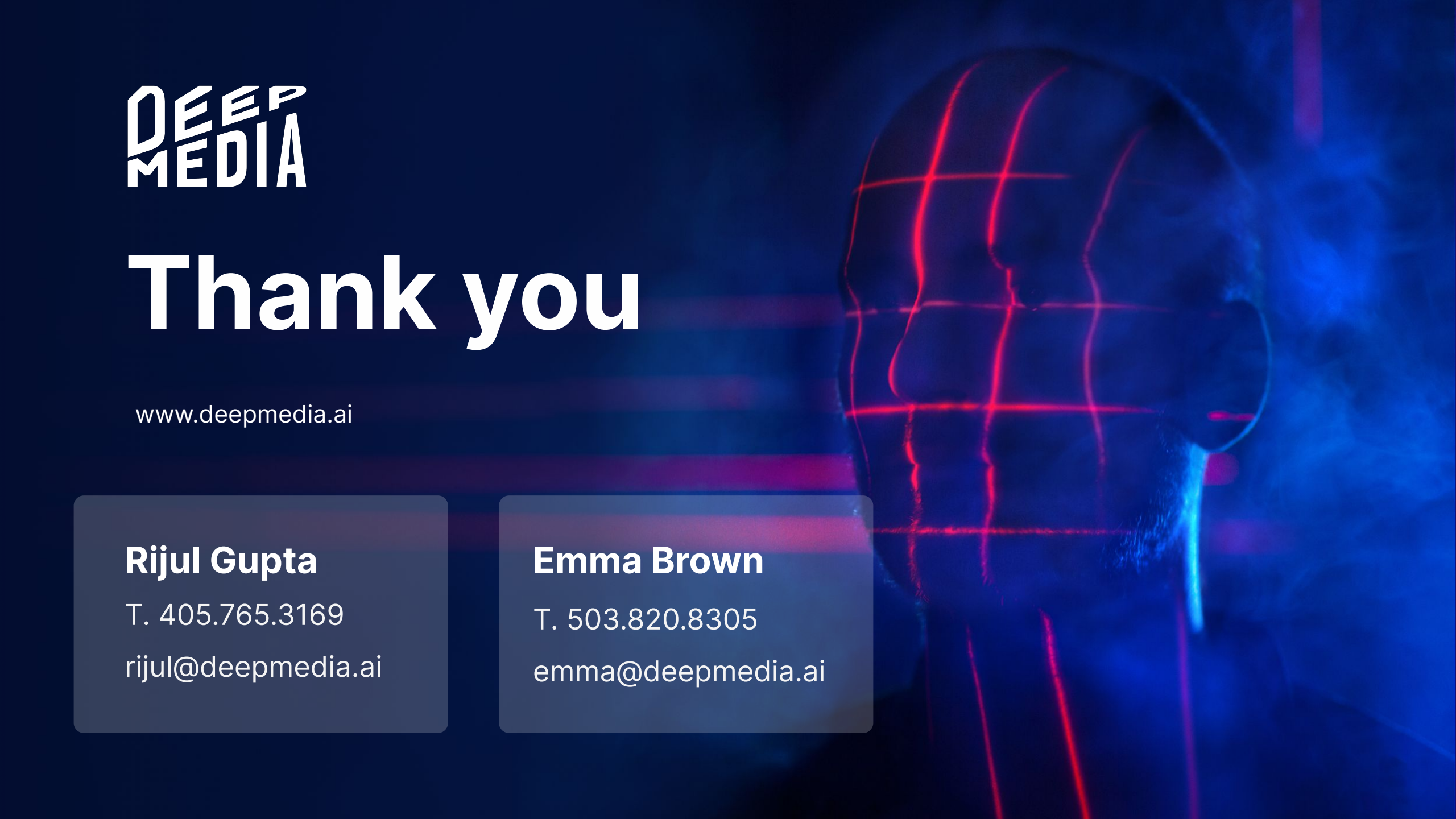
Concluding Thoughts

01 **Best-in-class:** DeepMedia's DeepFake detection provides the best solution to combat AI-Threats

02 **Urgent Tech Deployment:** Immediate need for our technology to address emerging Threats

03 **Hardware Integration**: Integrating with hardware systems to optimize performance

04 **Continuous Enhancements:** Advancing technology with refinements to improve functionality



Thank you

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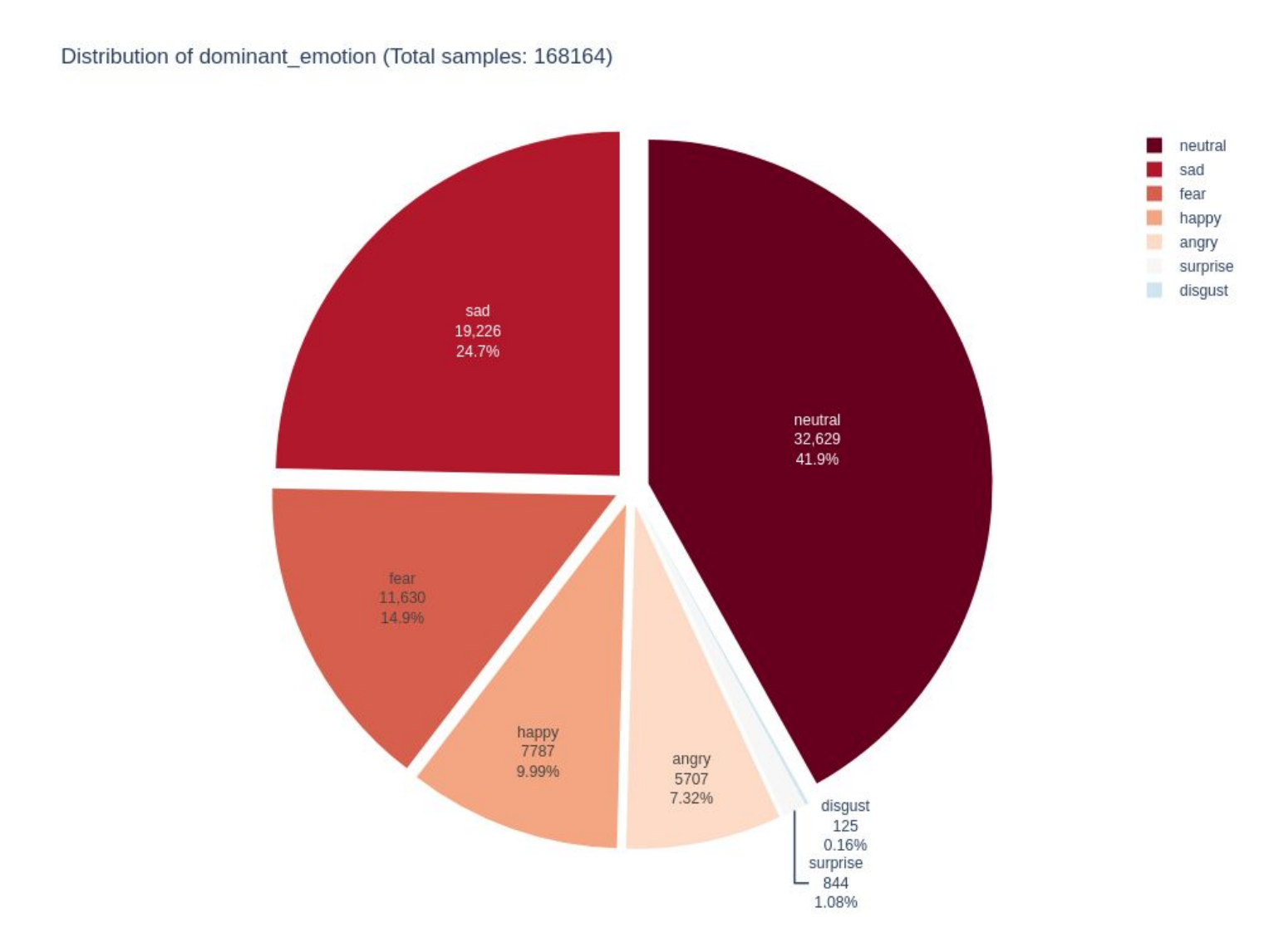
APPENDIX

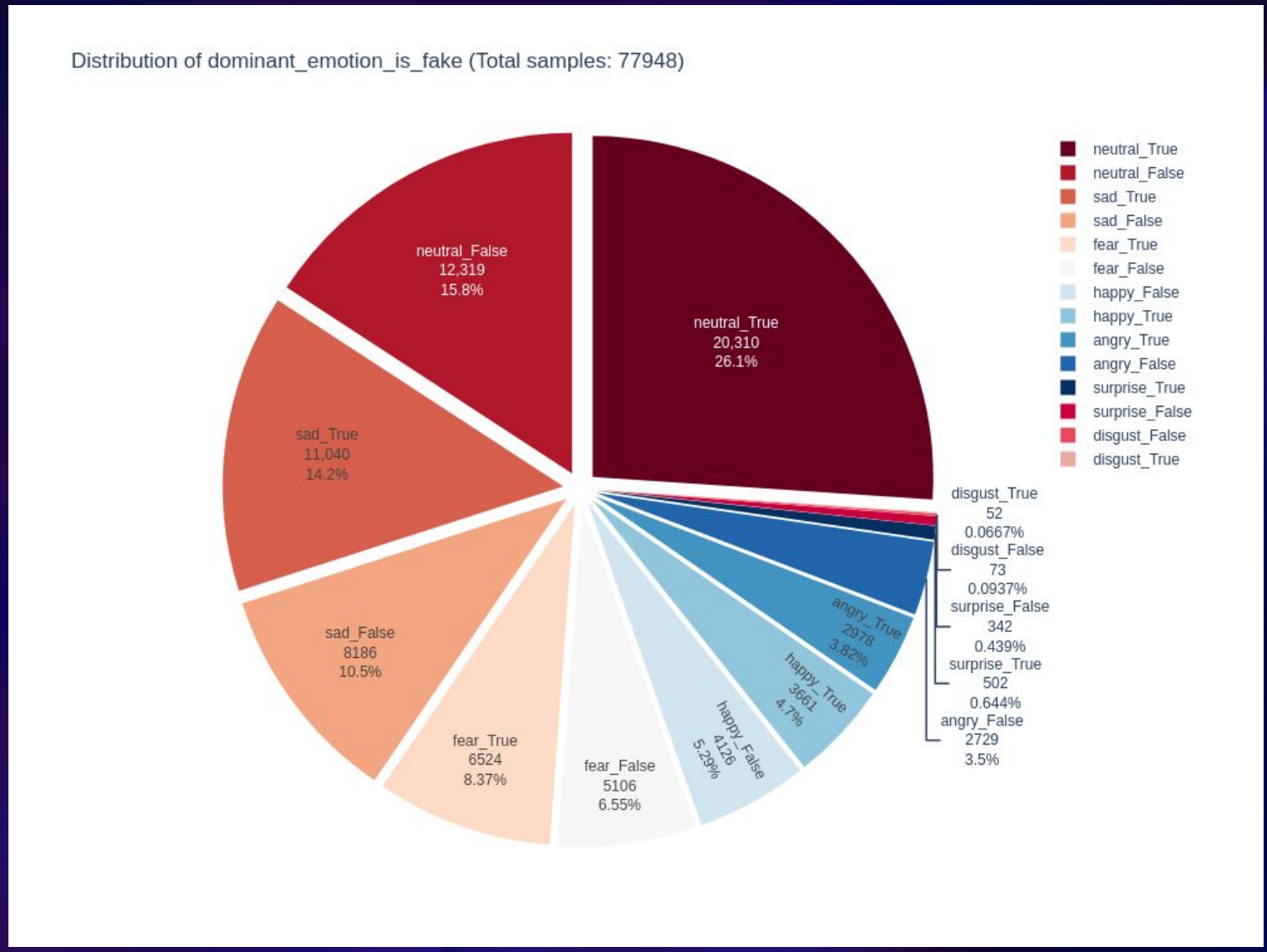
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Emotion Distribution



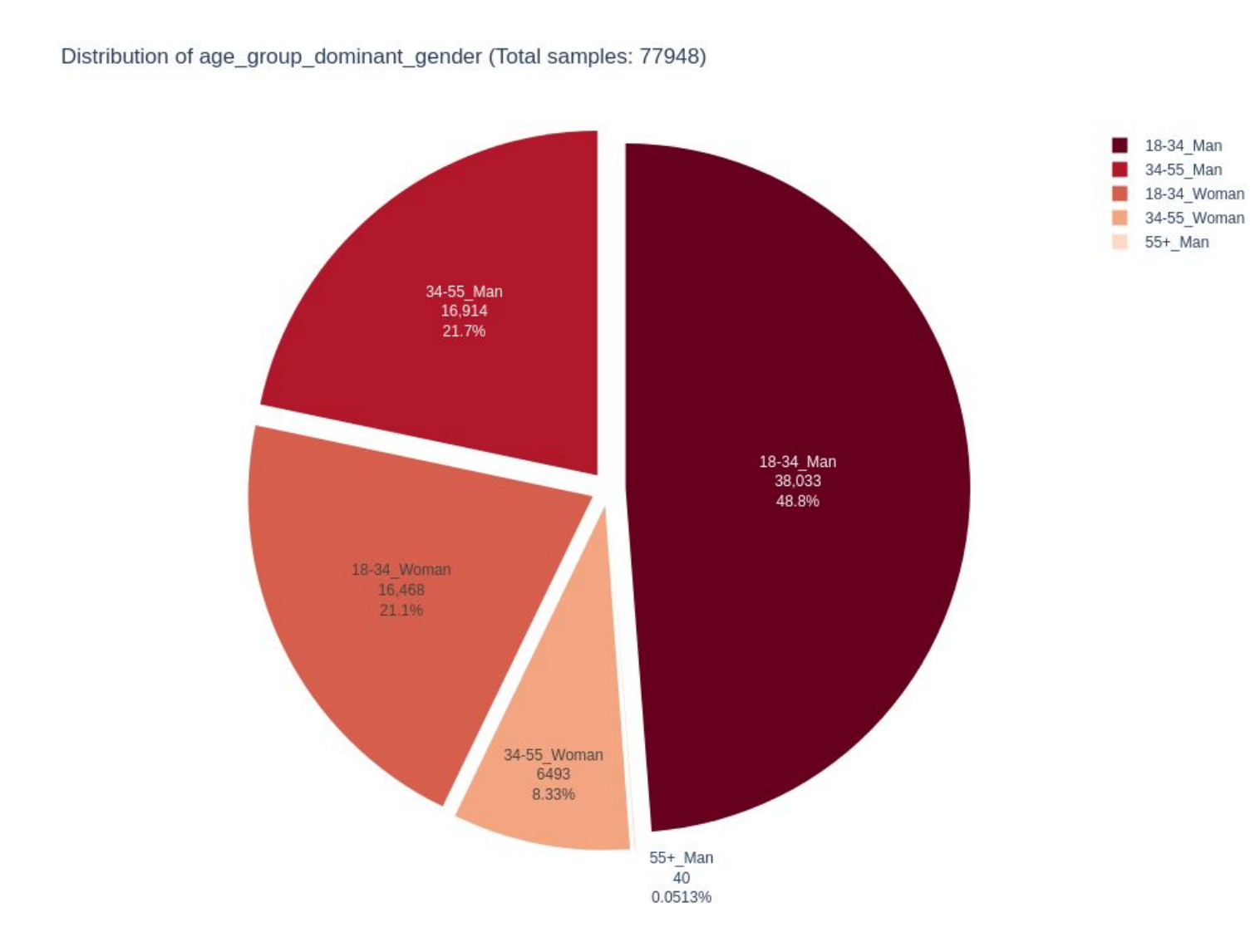
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Emotion X Real/Fake Distribution



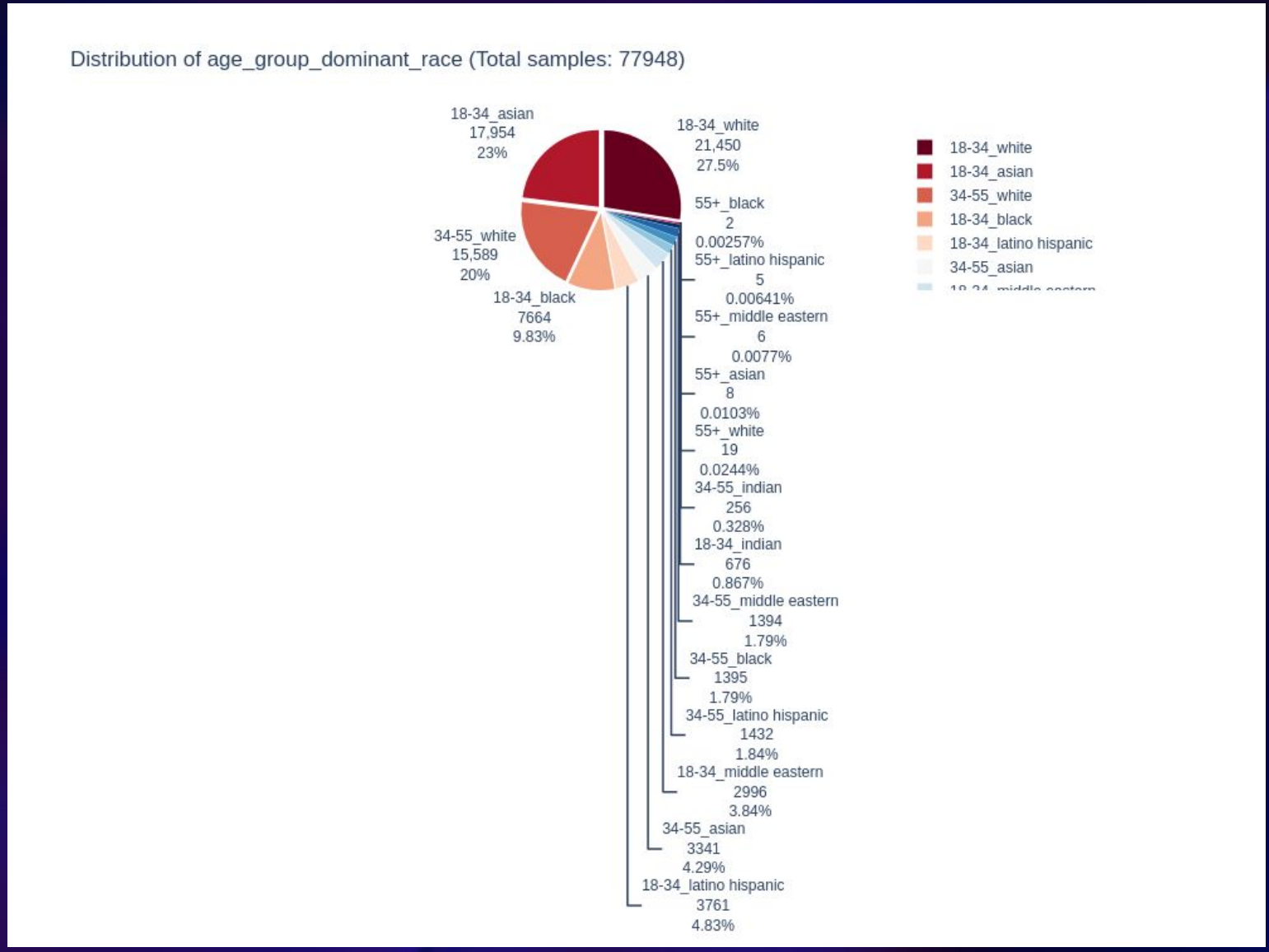
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Age X Gender Distribution



APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Age X Race Distribution



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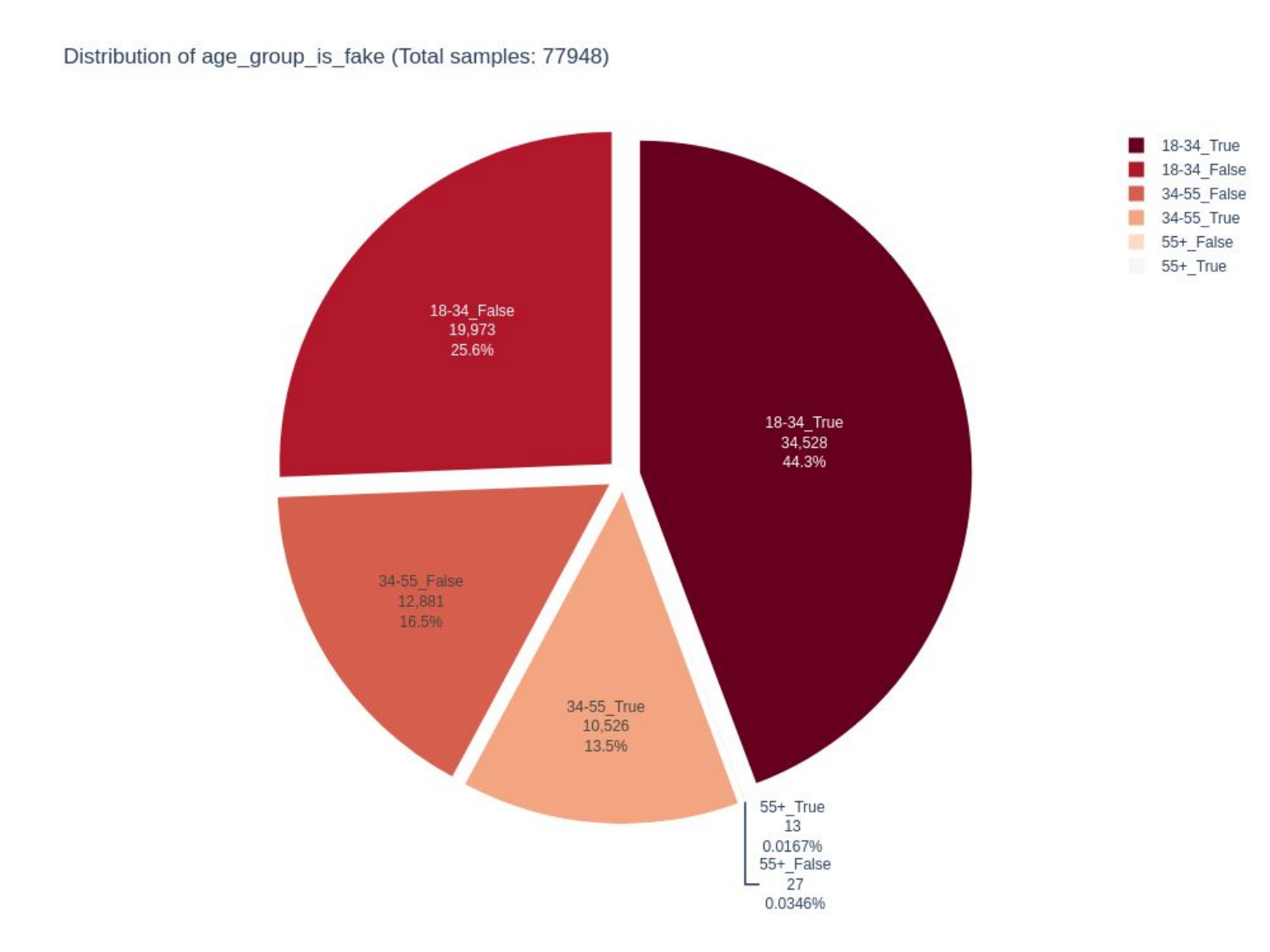
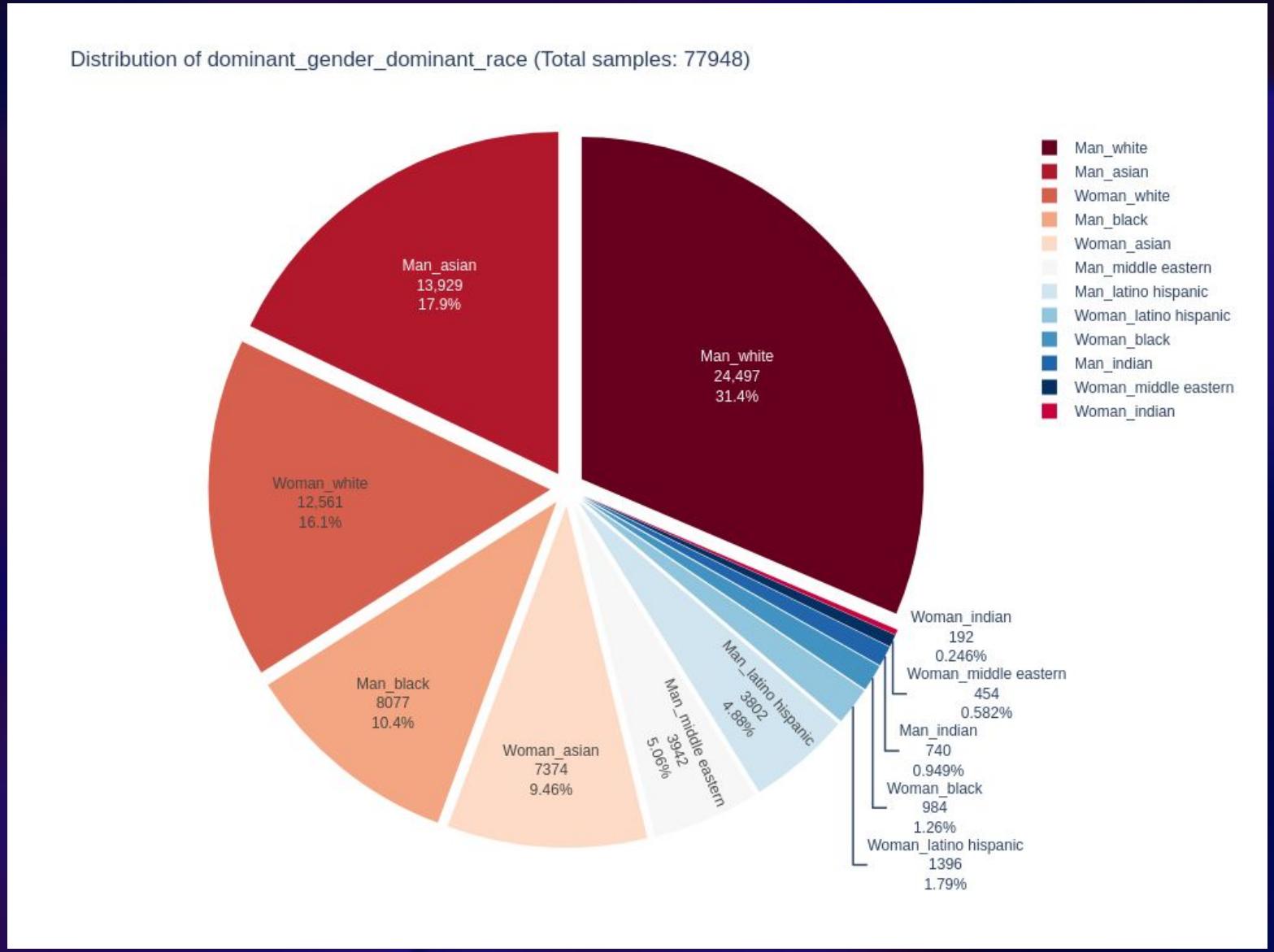
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Age X Real/Fake Distribution



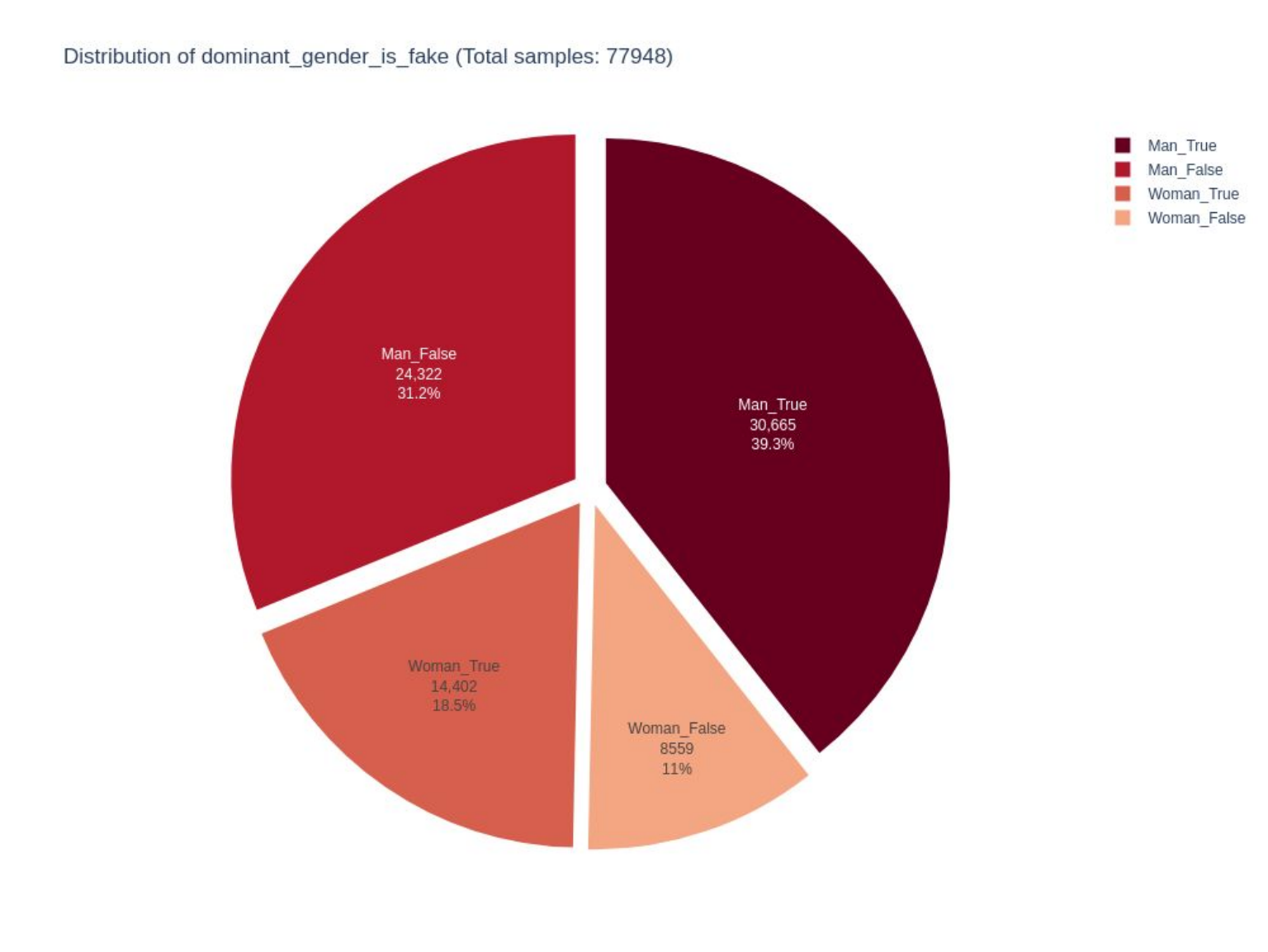
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Gender X Race Distribution



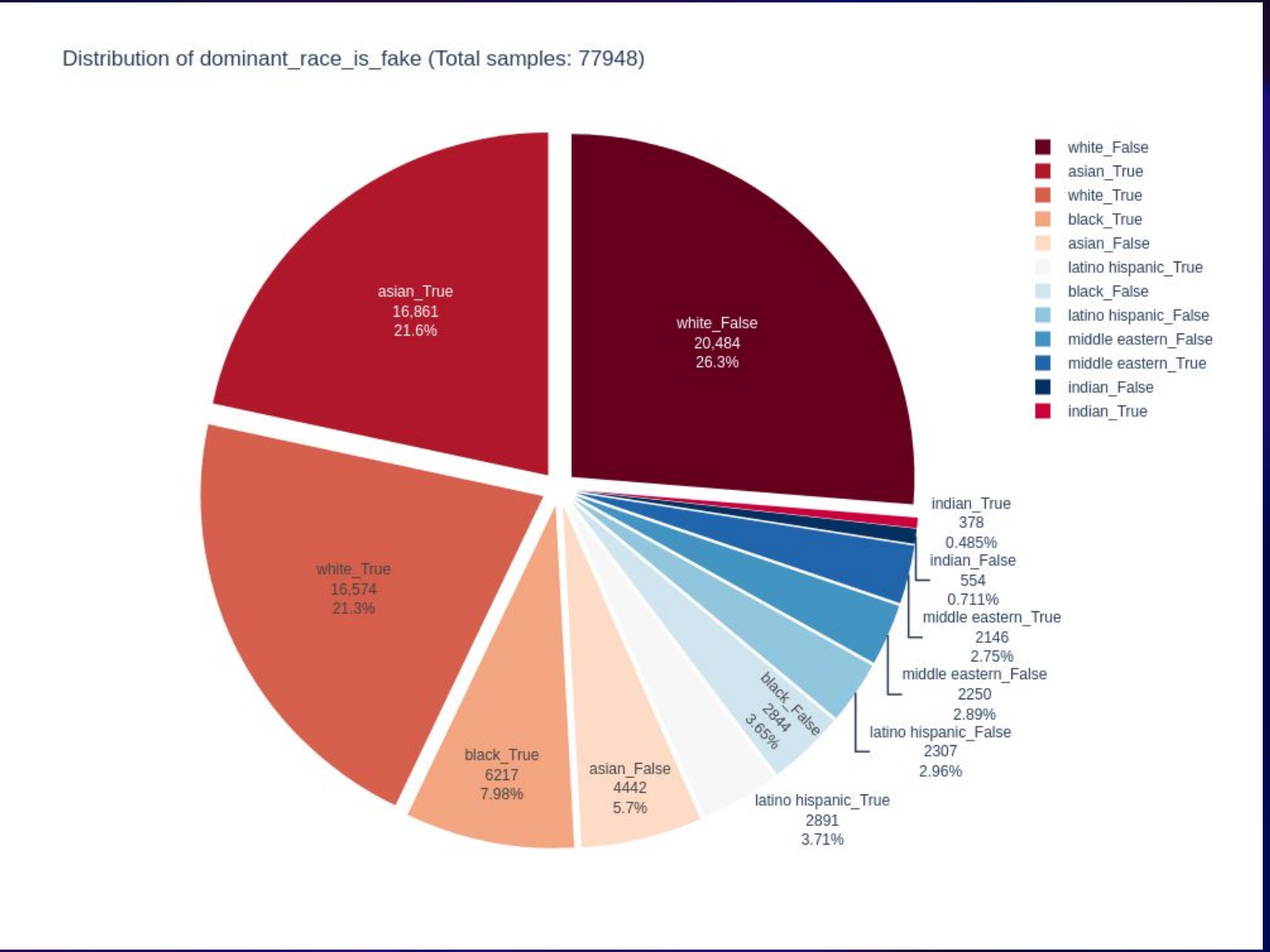
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Gender X Real/Fake Distribution



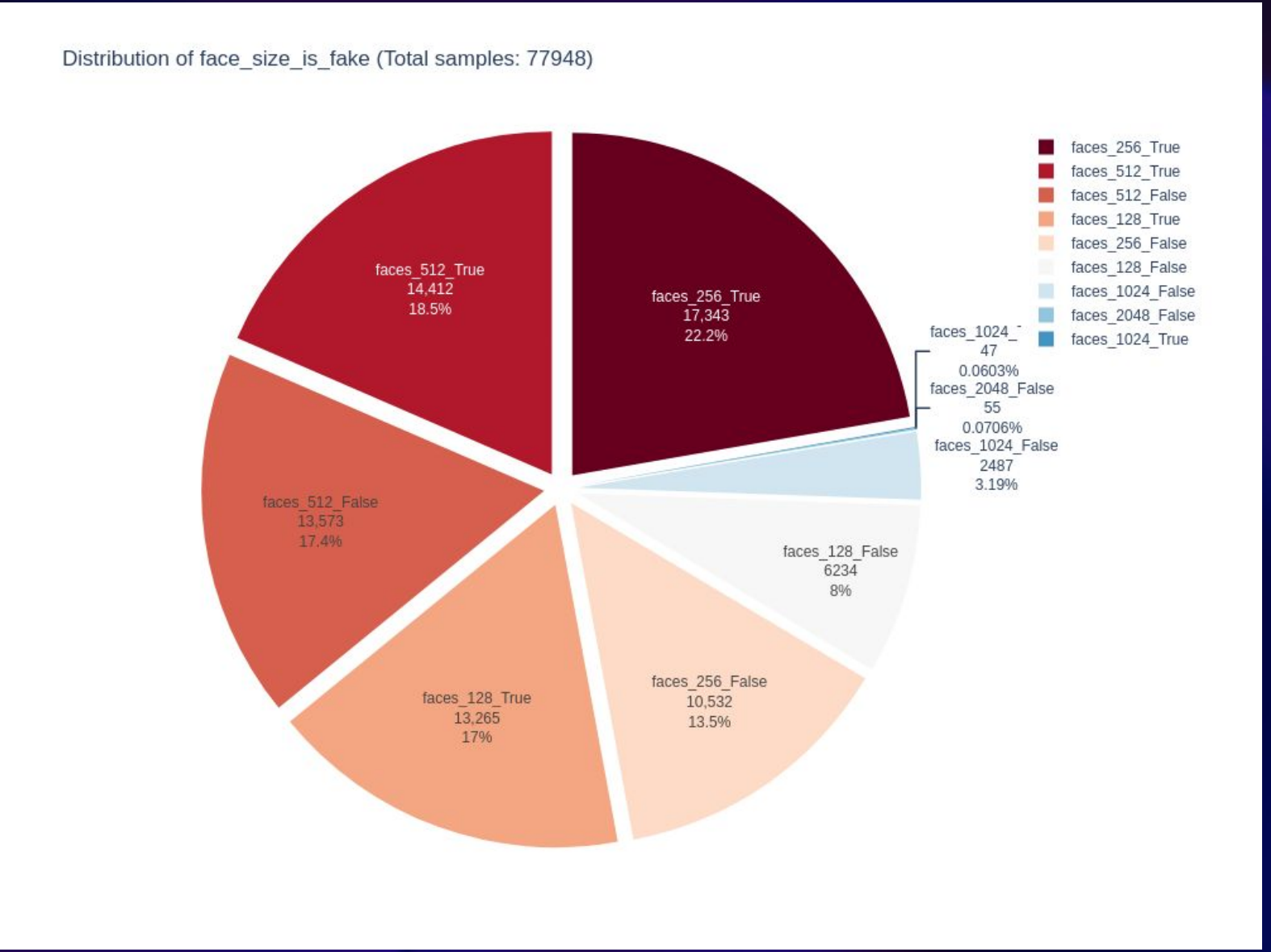
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Race X Real/Fake Distribution



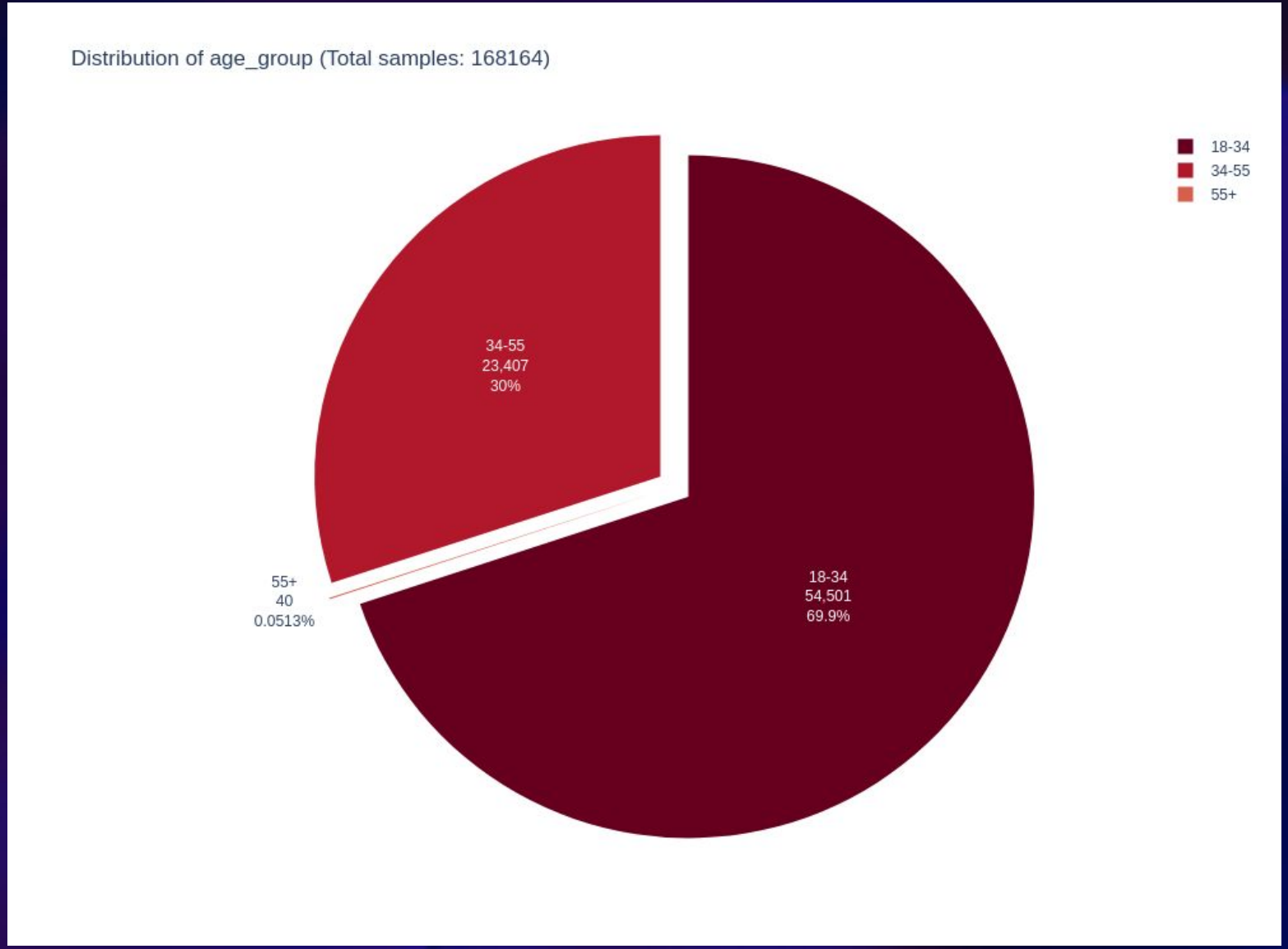
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Resolution X Real/Fake Distribution



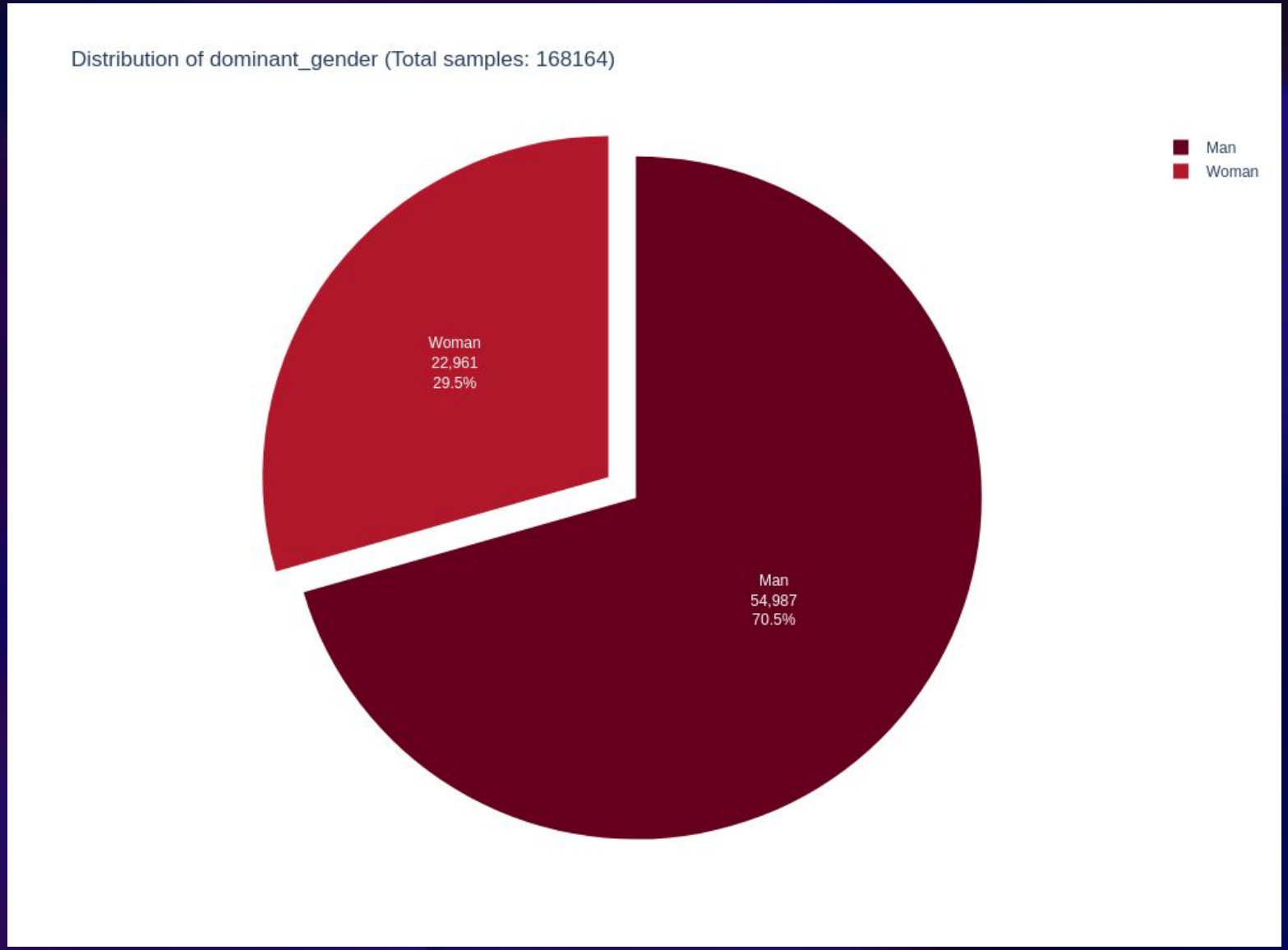
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Age Distribution



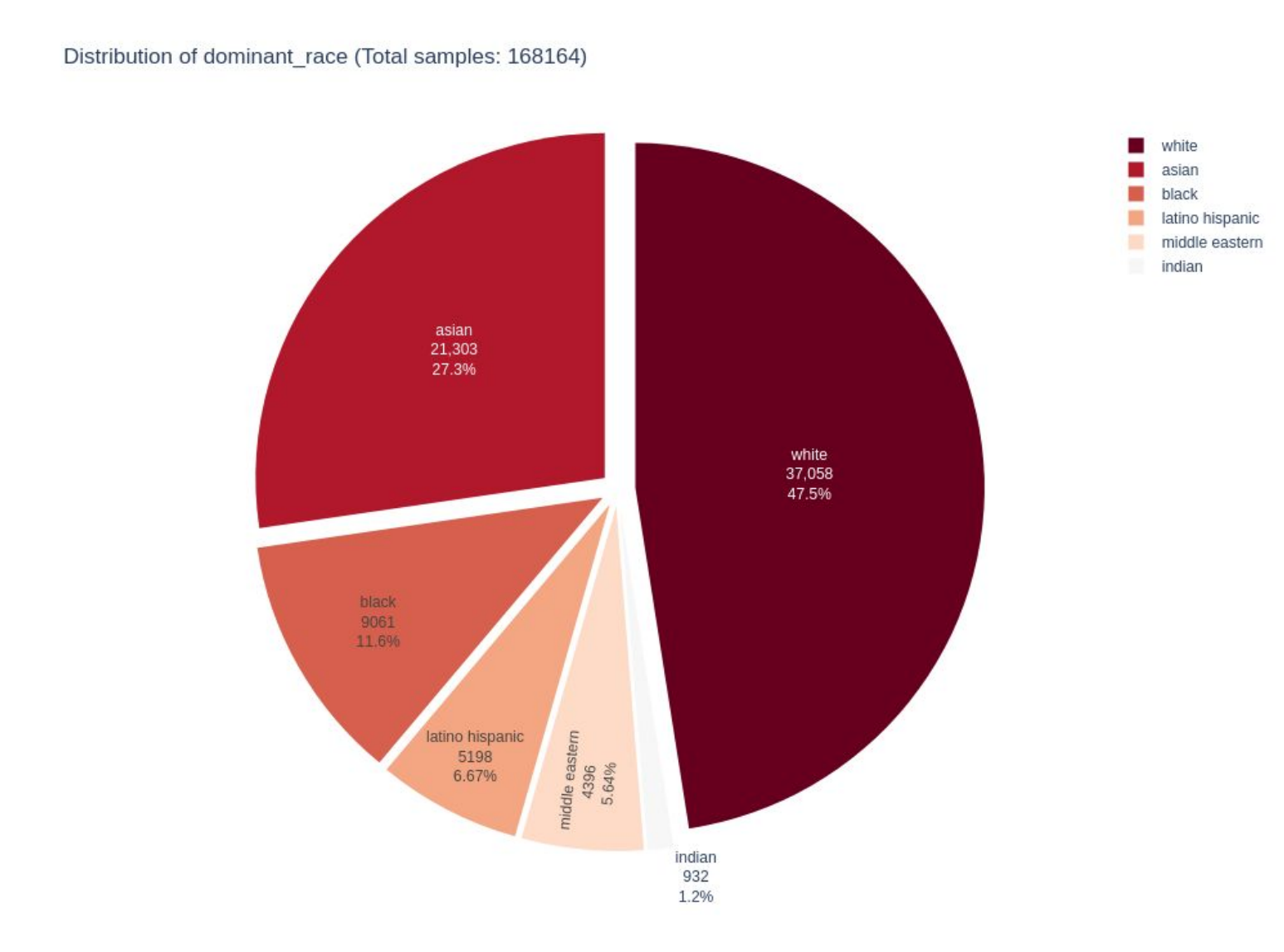
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Gender Distribution



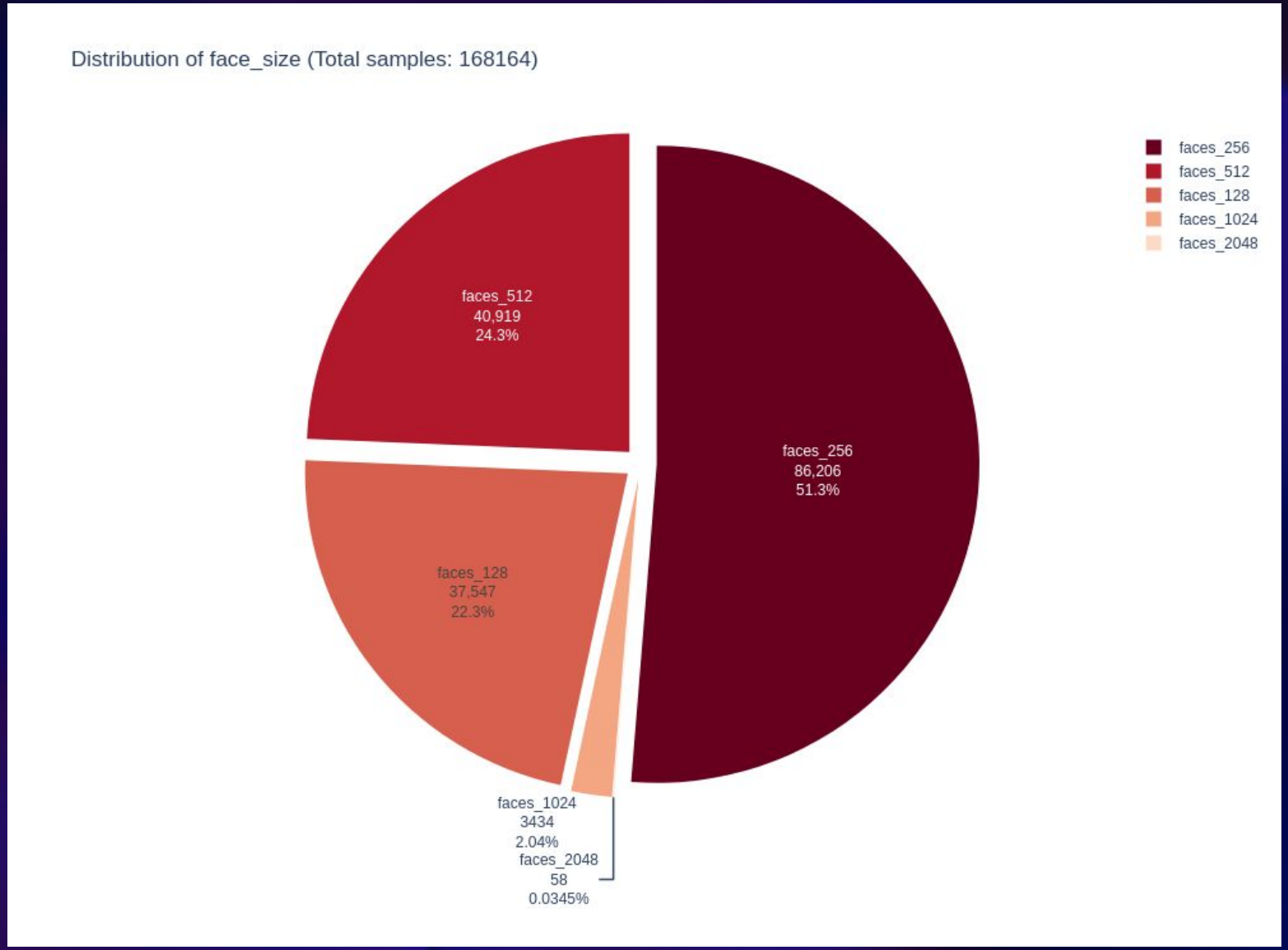
APPENDIX

Combating DeepFakes Requires Dataset Generation: Face Race Distribution



APPENDIX

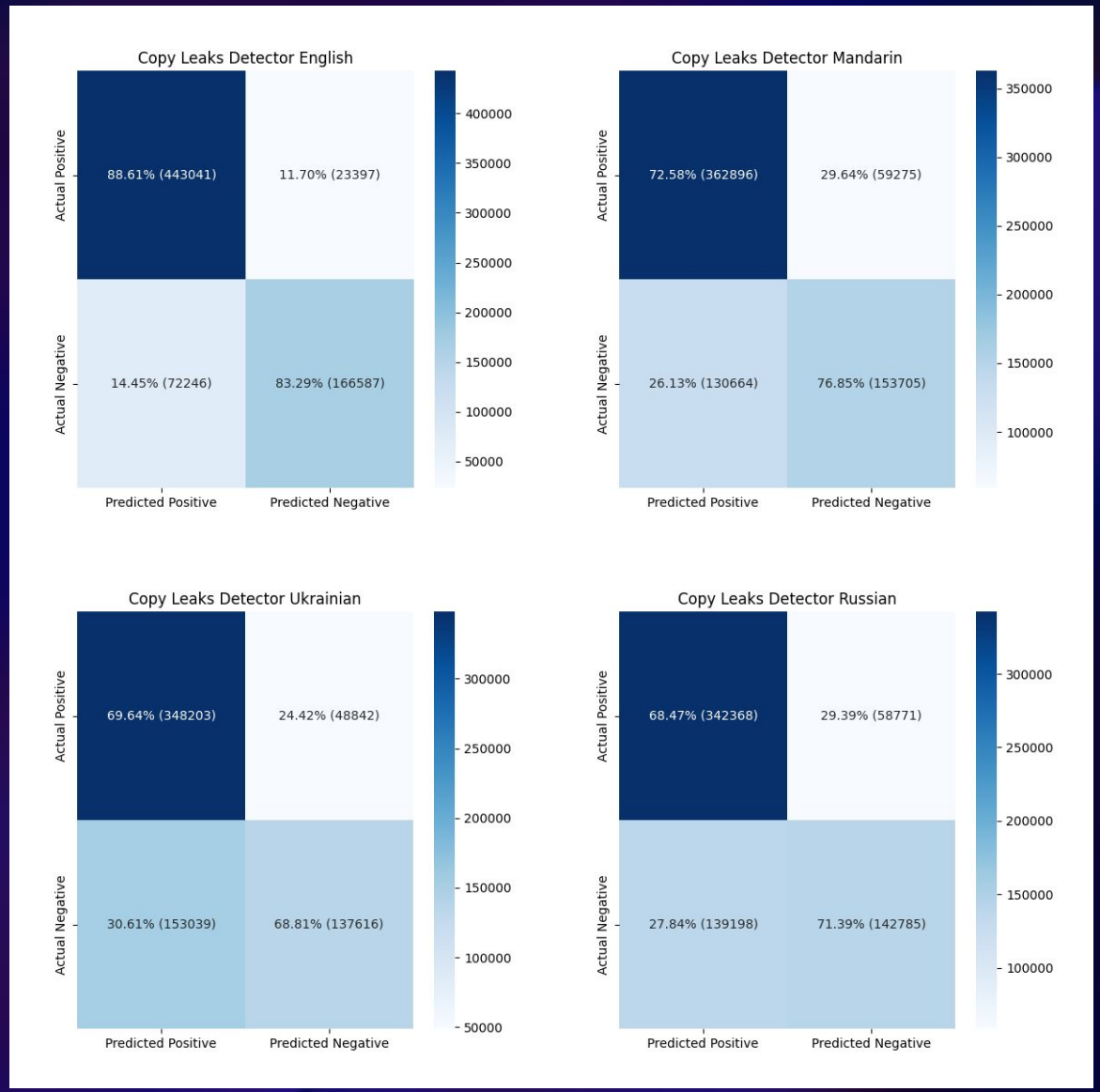
Combating DeepFakes Requires Dataset Generation: Face Resolution Distribution



APPENDIX

DeepFake Detection Results: Text

DM-TextDetector-1 English, Mandarin, Russian, Ukrainian



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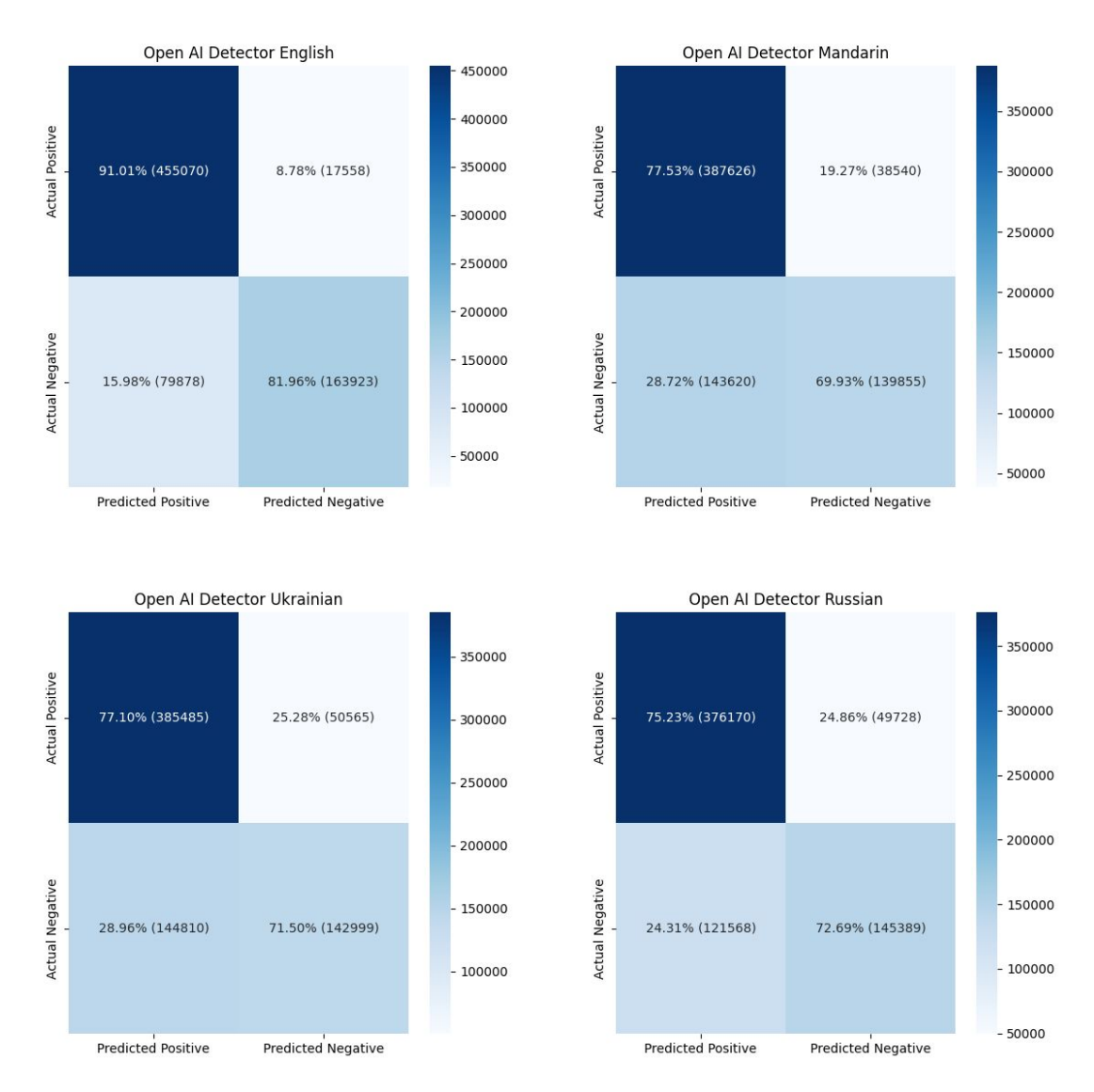
APPENDIX

DeepFake Detection Results: Text

DM-TextDetector-2 English, Mandarin, Russian, Ukrainian



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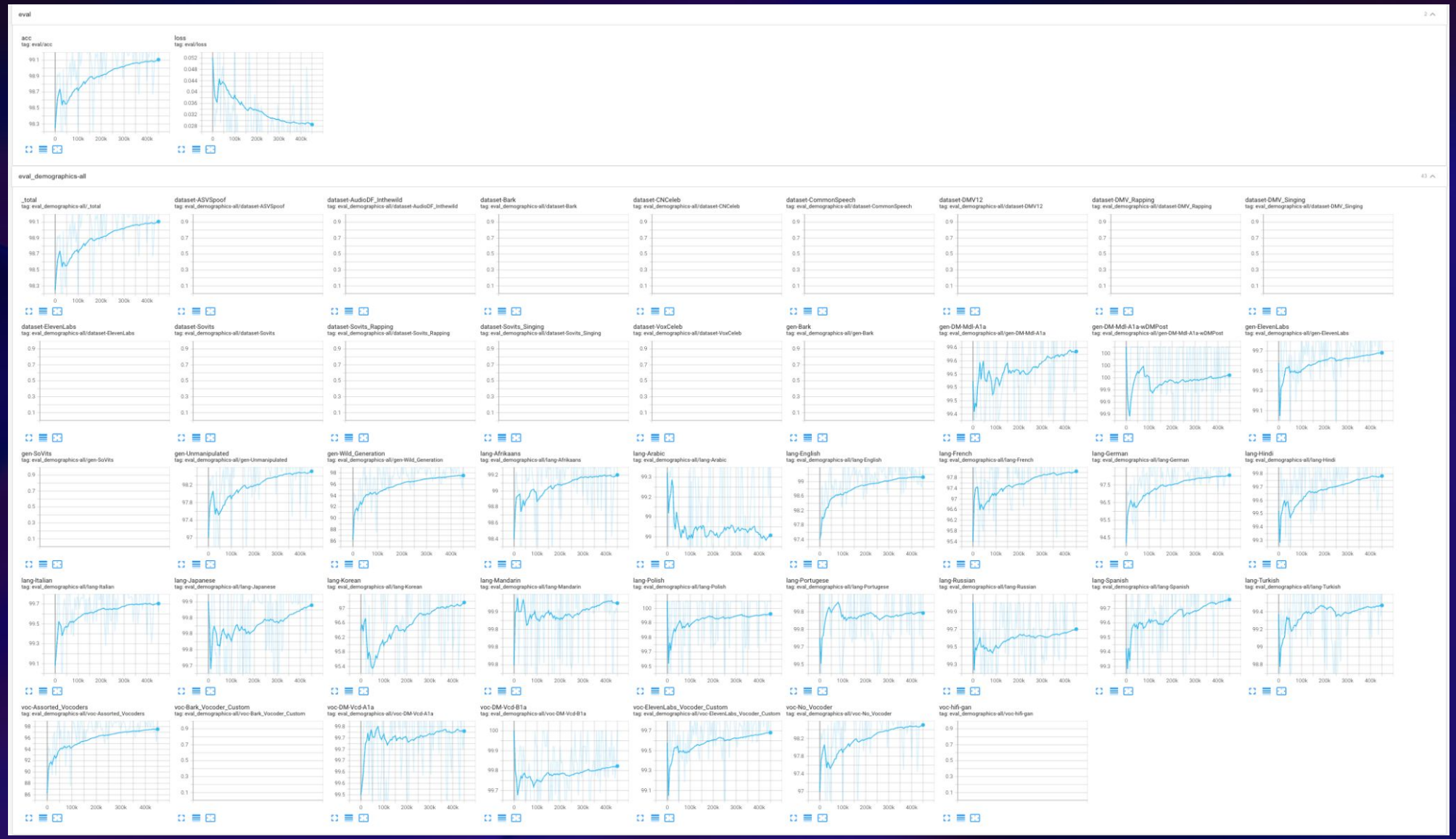
APPENDIX

DeepFake Detection Results: Voice

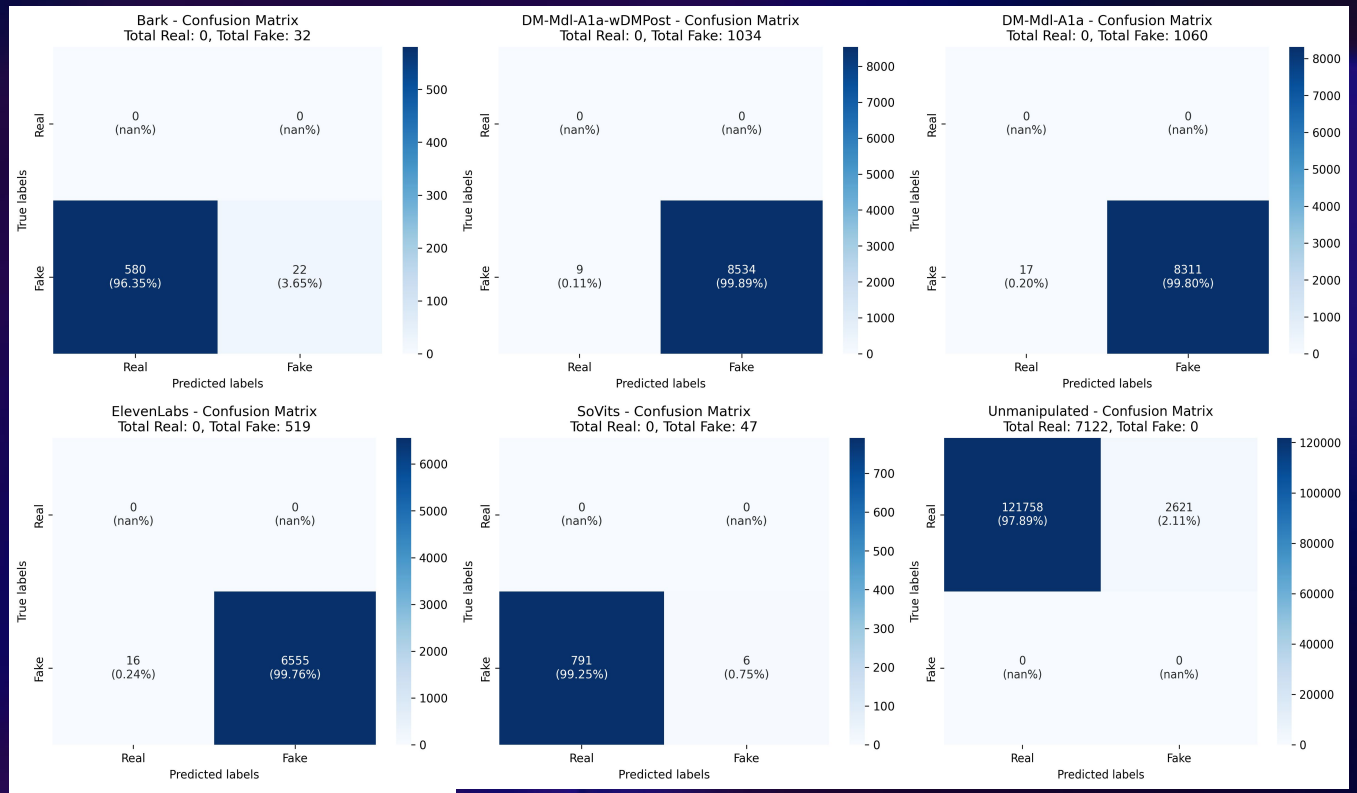
DM-VD-2 Training Logs (No Augmentation)



APPENDIX

DeepFake Detection Results: Voice

DM-VD-2 Results (No Augmentation)



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APPENDIX

DeepFake Detection Results: Voice

DM-VD-2 Results (No Augmentation)

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APPENDIX

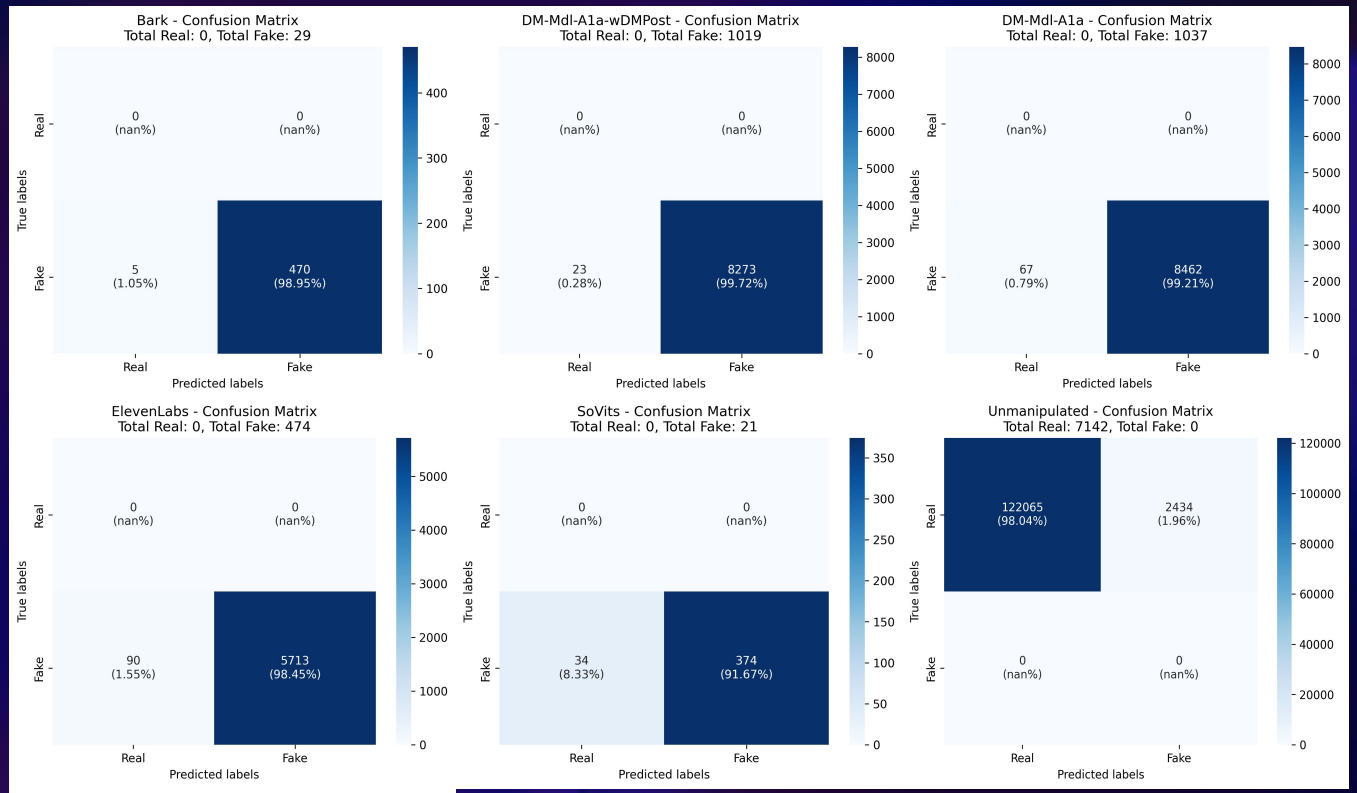
DeepFake Detection Results: Voice

DM-VD-2 Training Logs (With Augmentation)

APPENDIX

DeepFake Detection Results: Voice

DM-VD-2 Results (With Augmentation)



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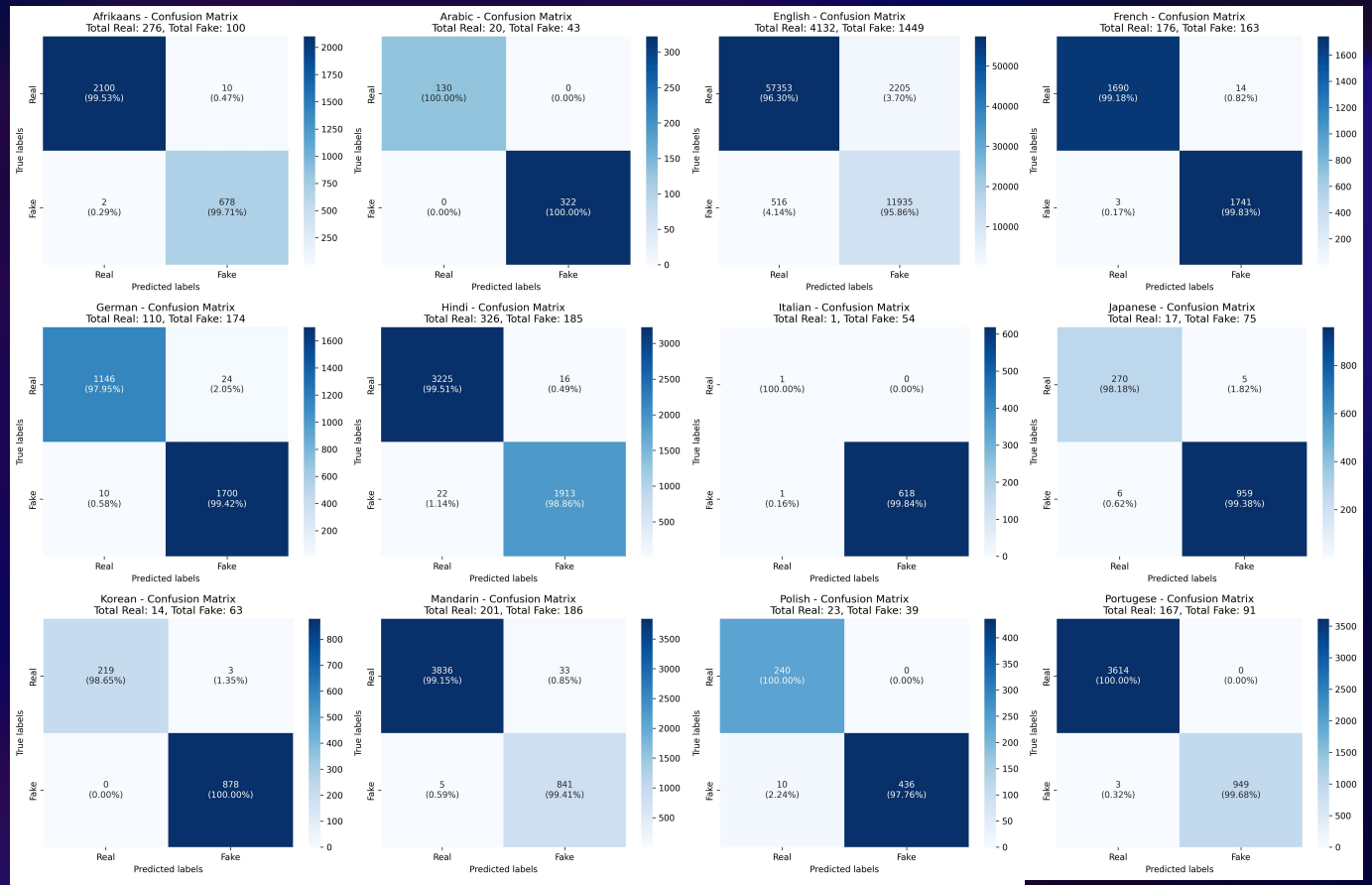
APPENDIX

DeepFake Detection Results: Voice

DM-VD-2 Results (With Augmentation)



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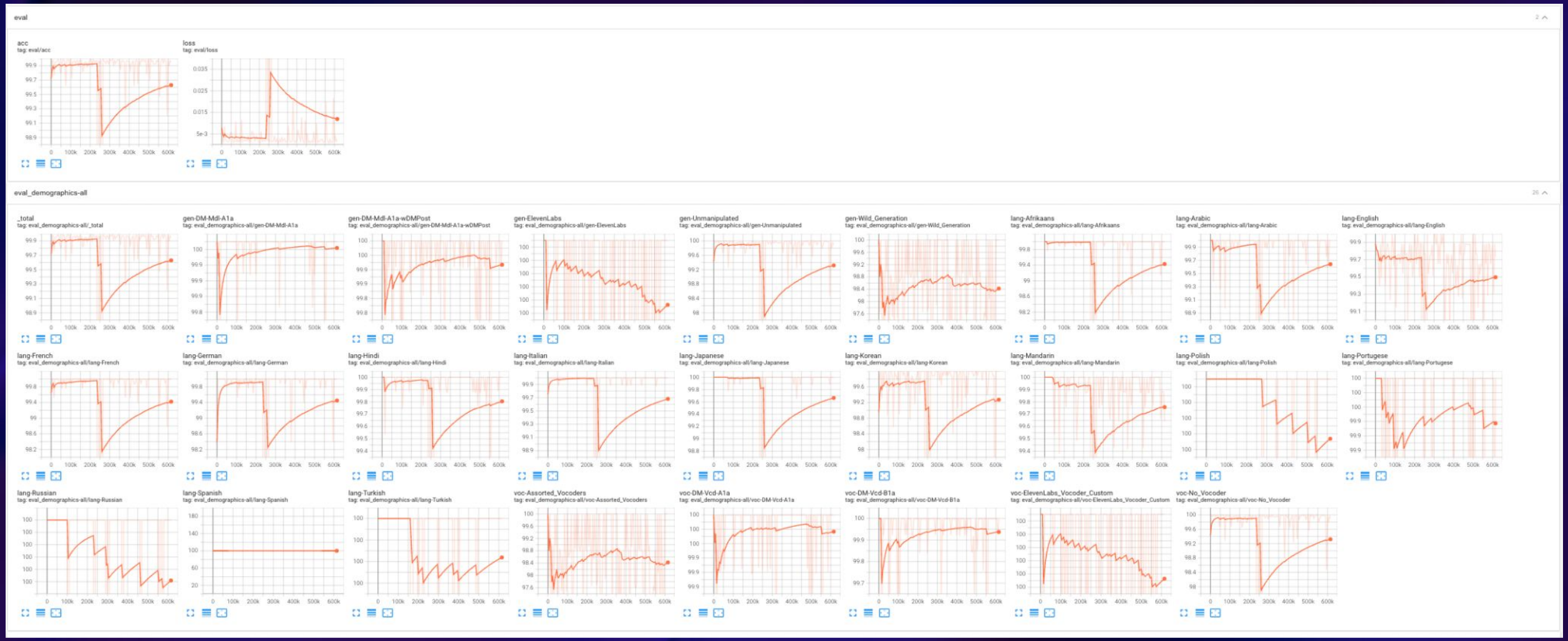
APPENDIX

DeepFake Detection Results: Voice

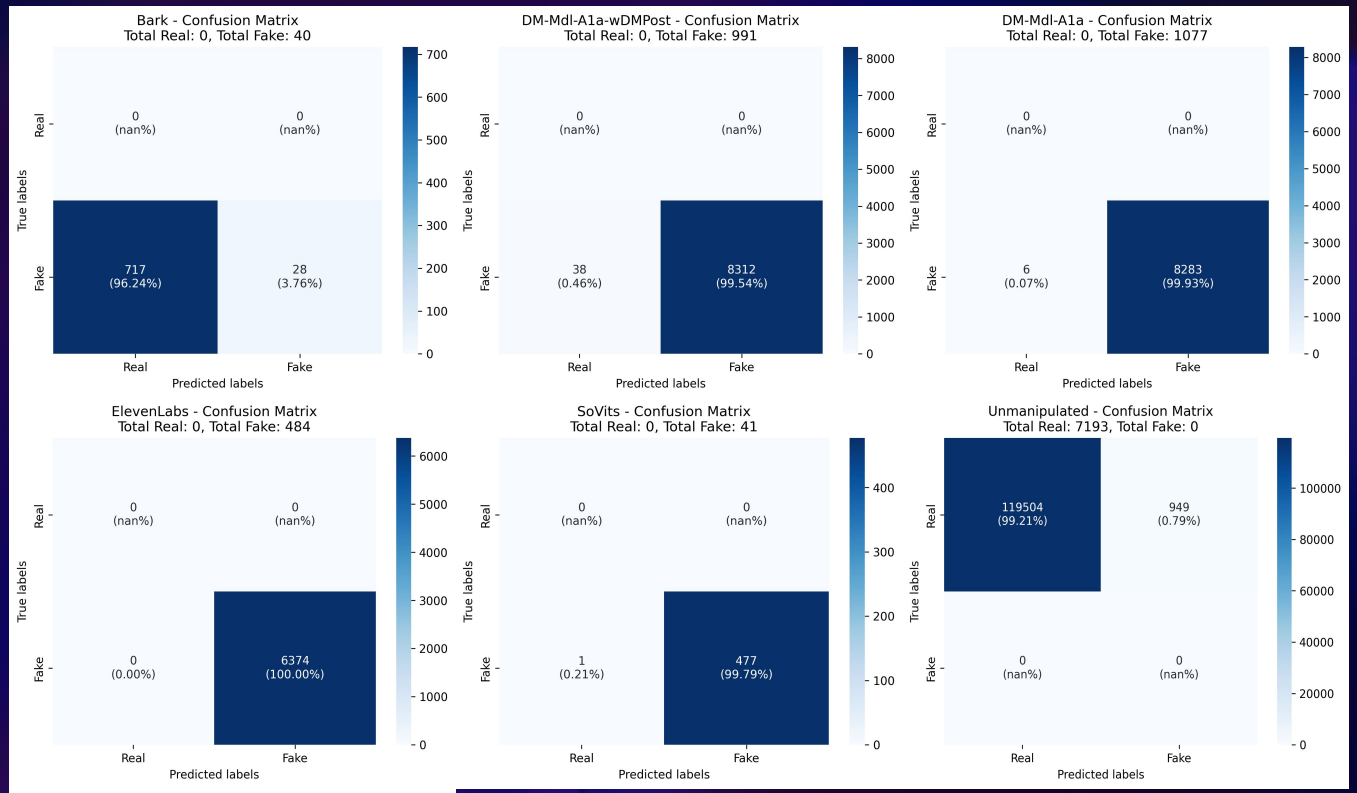
DM-VD-3 Detector Training Logs (No Augmentation)



APPENDIX

DeepFake Detection Results: Voice

DM-VD-3 Detector Results (No Augmentation)



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APPENDIX

DeepFake Detection Results: Voice

DM-VD-3 Detector Results (No Augmentation)

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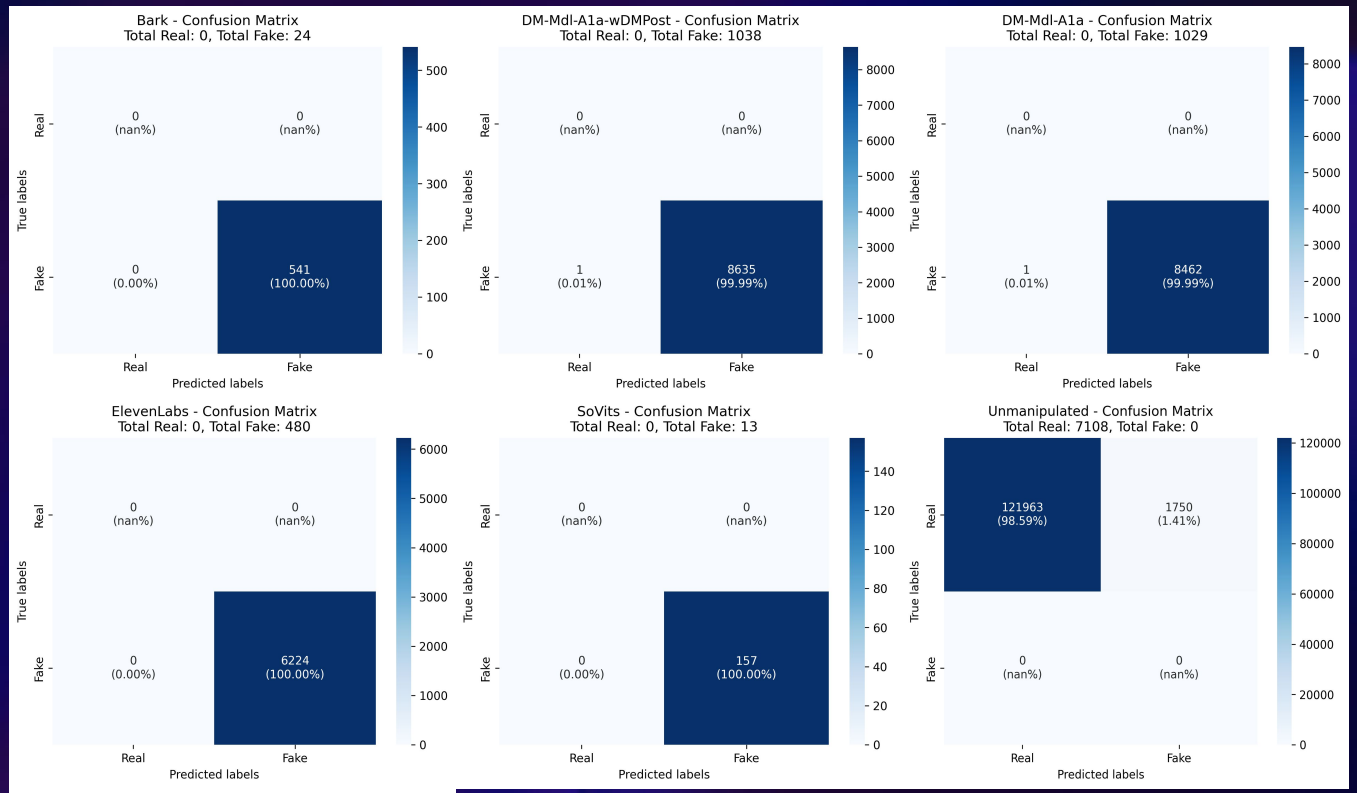
APPENDIX

DeepFake Detection Results: Voice

DM-VD-3 Detector Results (With Augmentation)



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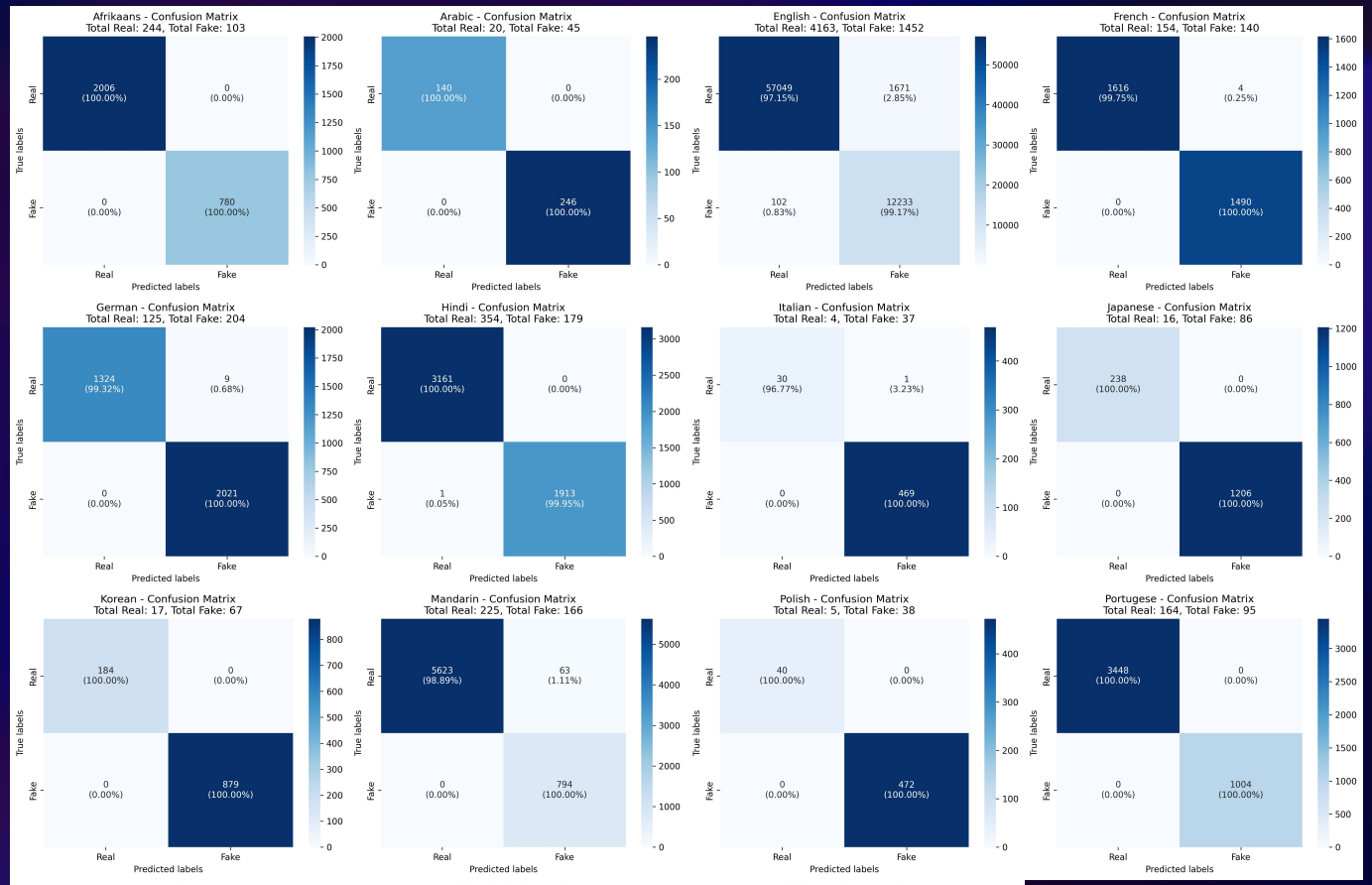
APPENDIX

DeepFake Detection Results: Voice

DM-VD-3 Detector Results (With Augmentation)



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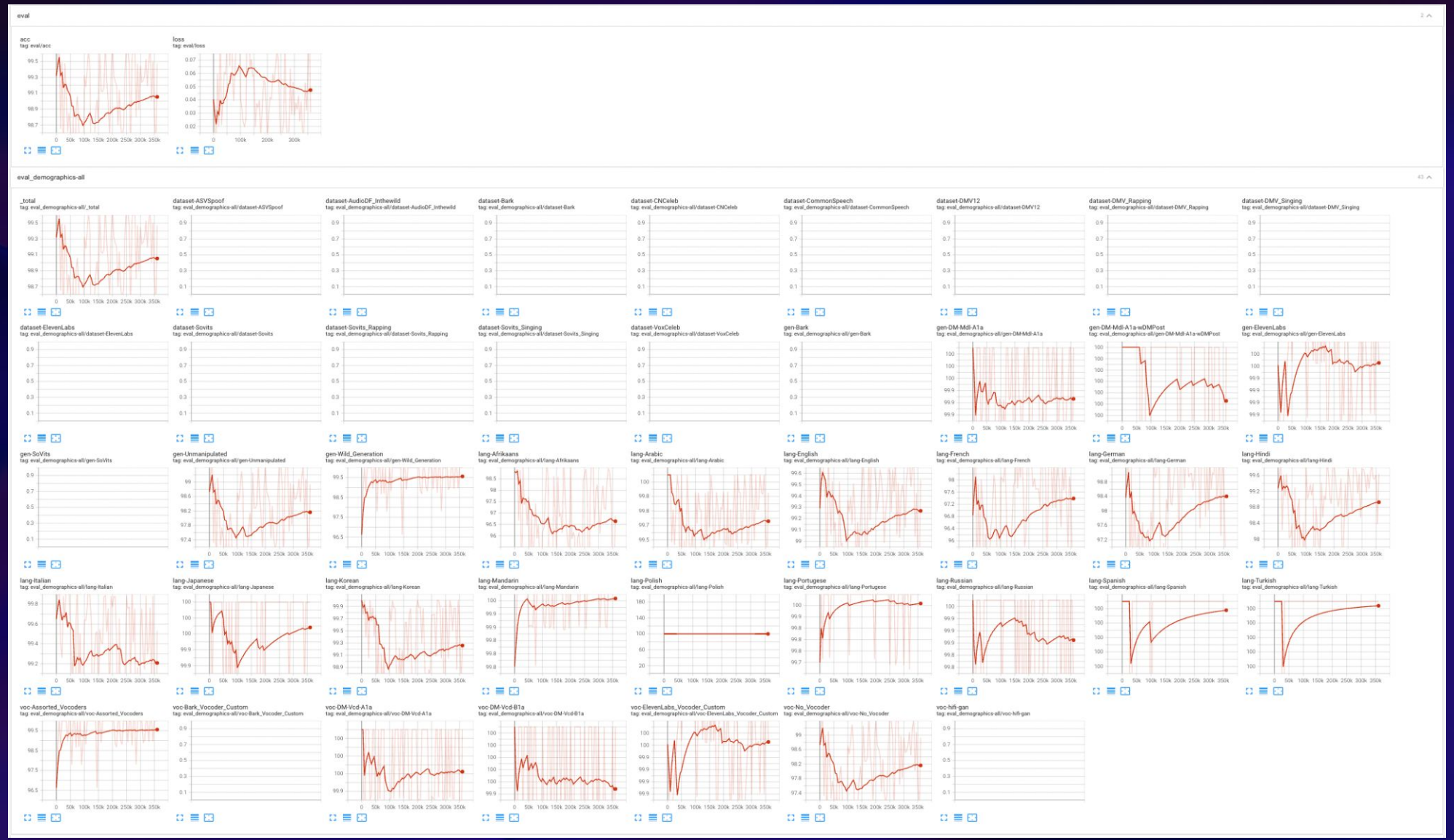
APPENDIX

DeepFake Detection Results: Voice

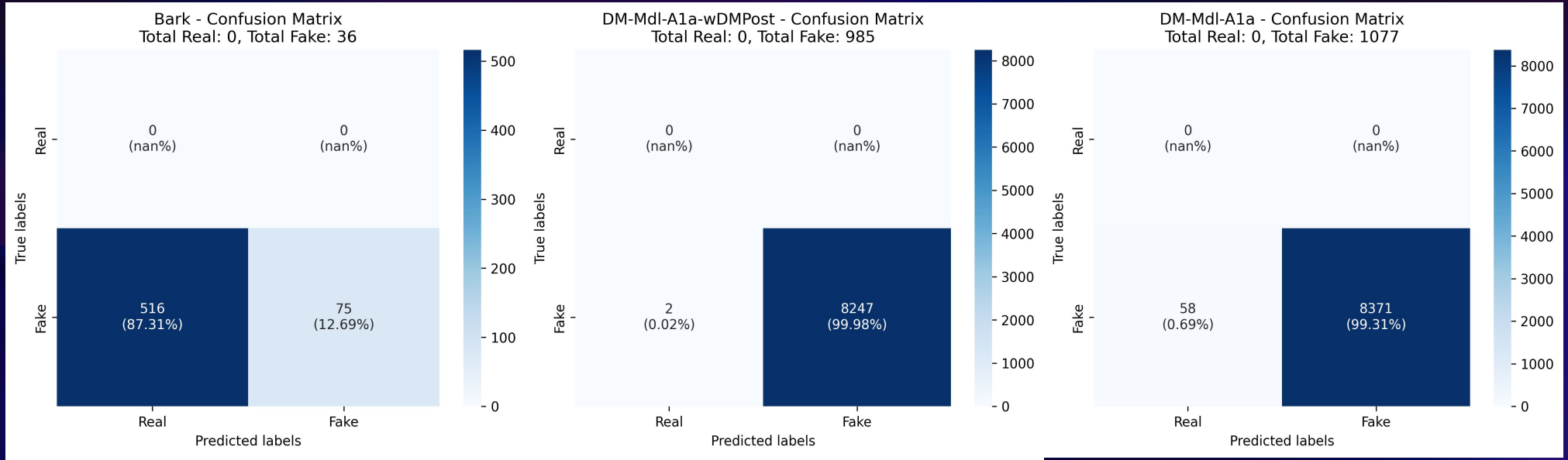
DM-VD-1 Detector Training Logs (No Augmentation)

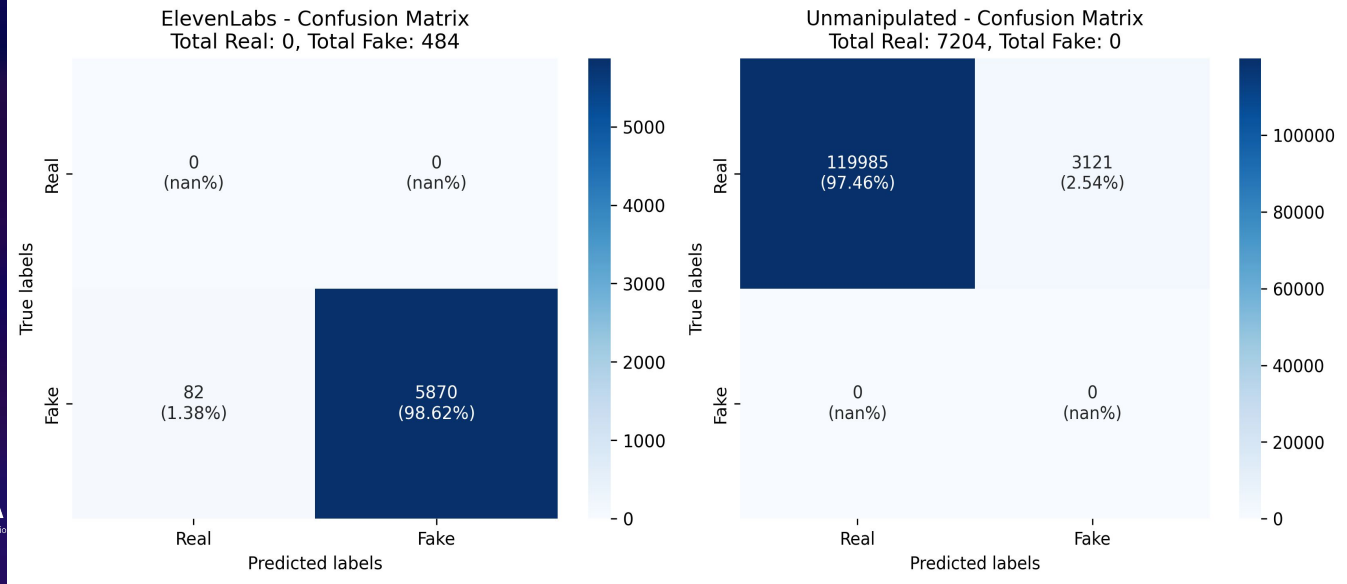


APPENDIX

DeepFake Detection Results: Voice

DM-VD-1 Detector Results (No Augmentation)





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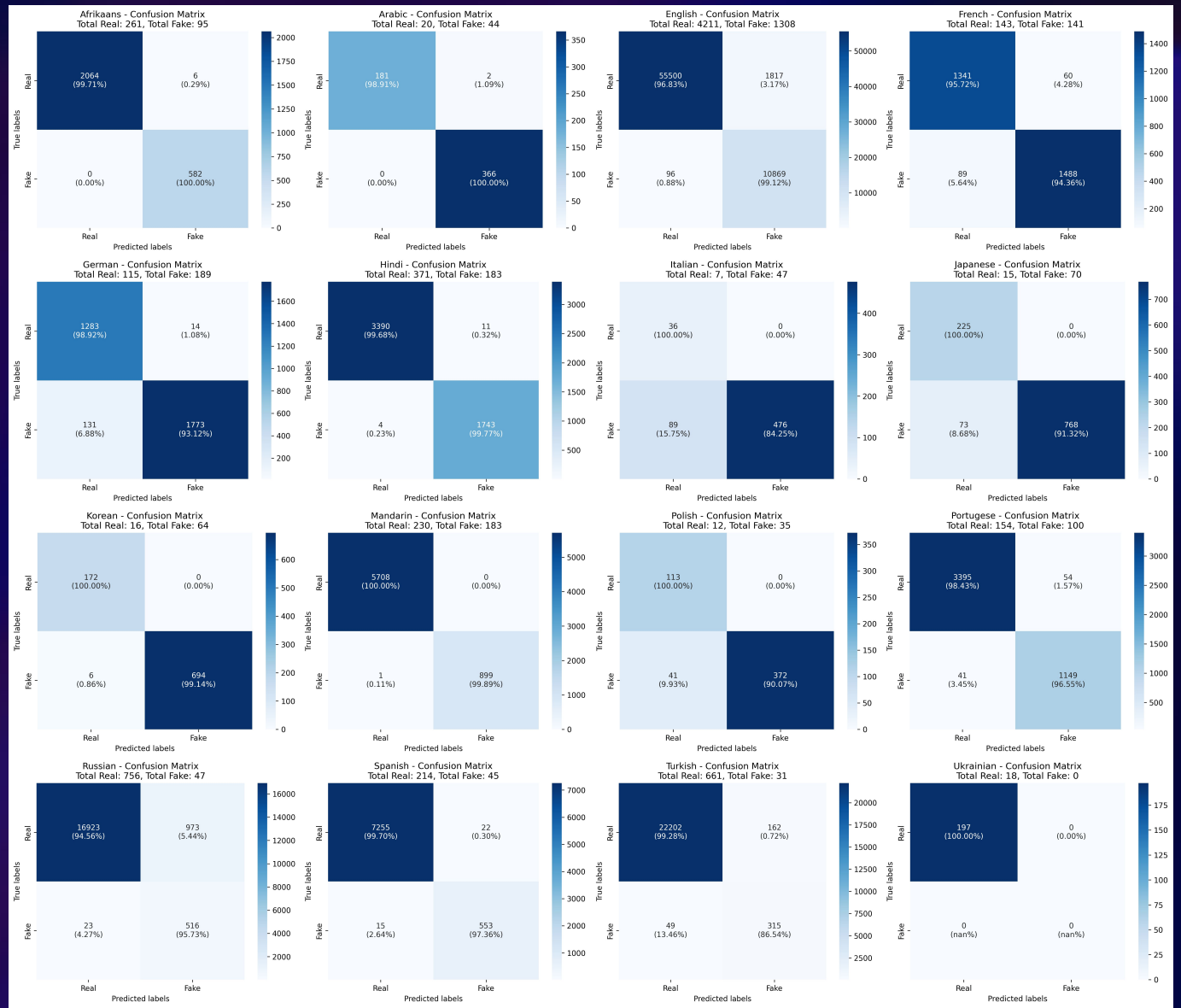
APPENDIX

DeepFake Detection Results: Voice

DM-VD-1 Detector Results (No Augmentation)



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APPENDIX

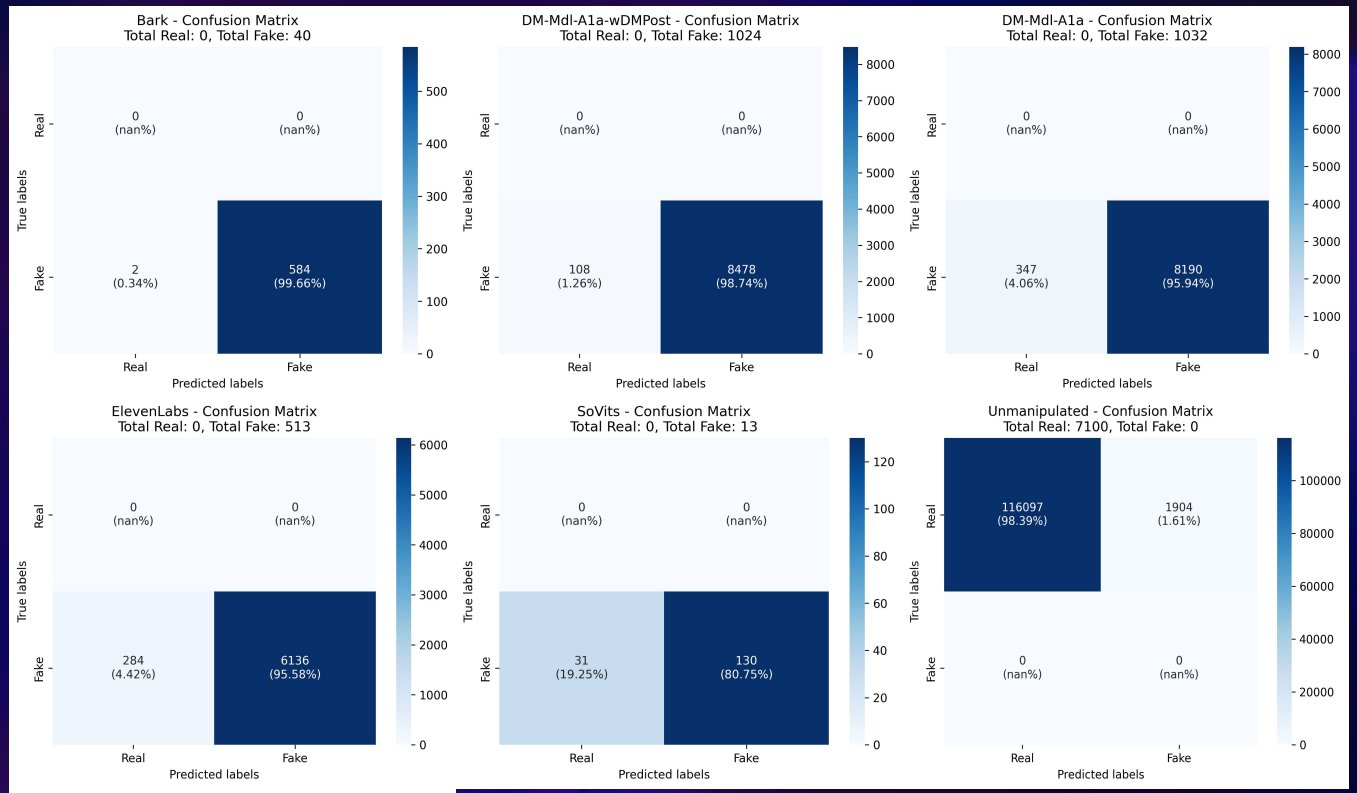
DeepFake Detection Results: Voice

DM-VD-1 Detector Training Logs (With Augmentation)

APPENDIX

DeepFake Detection Results: Voice

DM-VD-1 Detector Results (With Augmentation)



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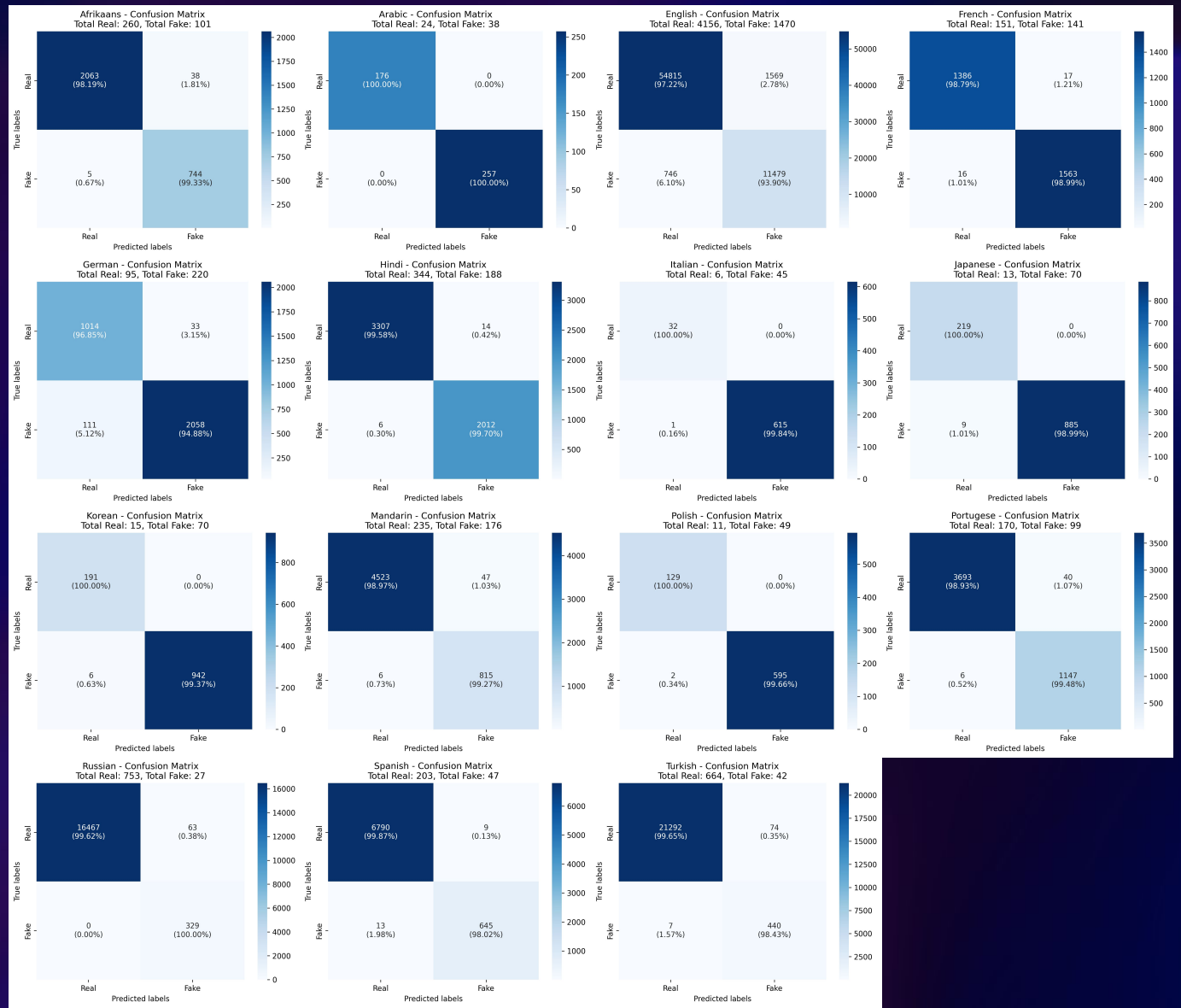
APPENDIX

DeepFake Detection Results: Voice

DM-VD-1 Detector Results (With Augmentation)



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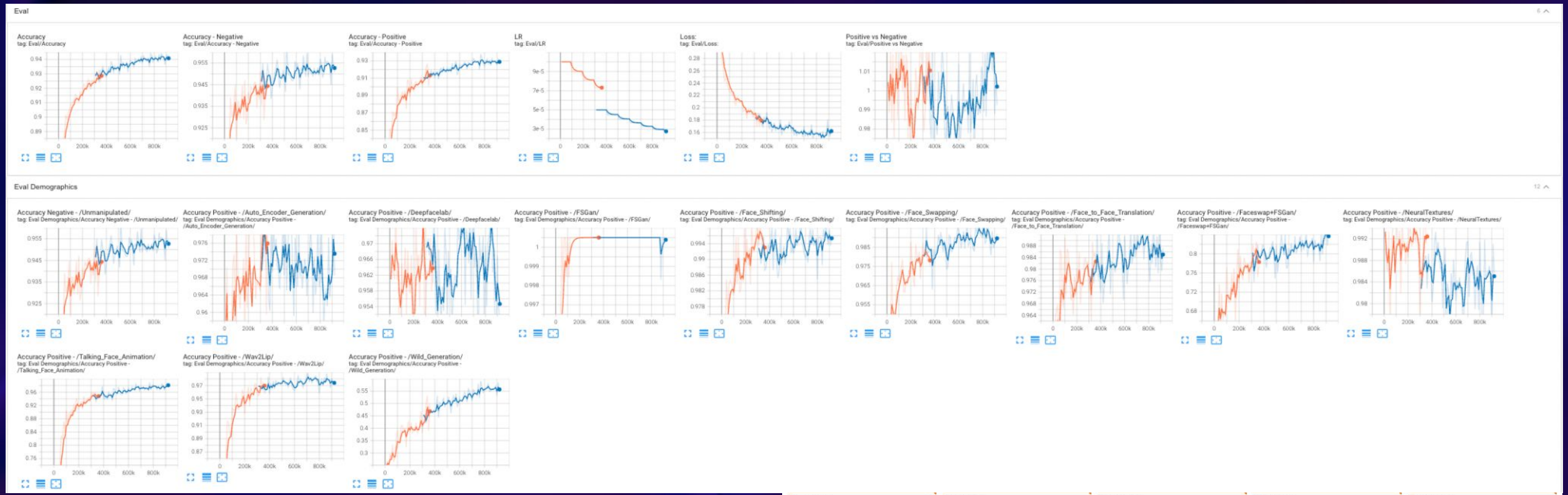
APPENDIX

DeepFake Detection Results: Face

DM-FD-1 Detector Training Logs (No Augmentation)



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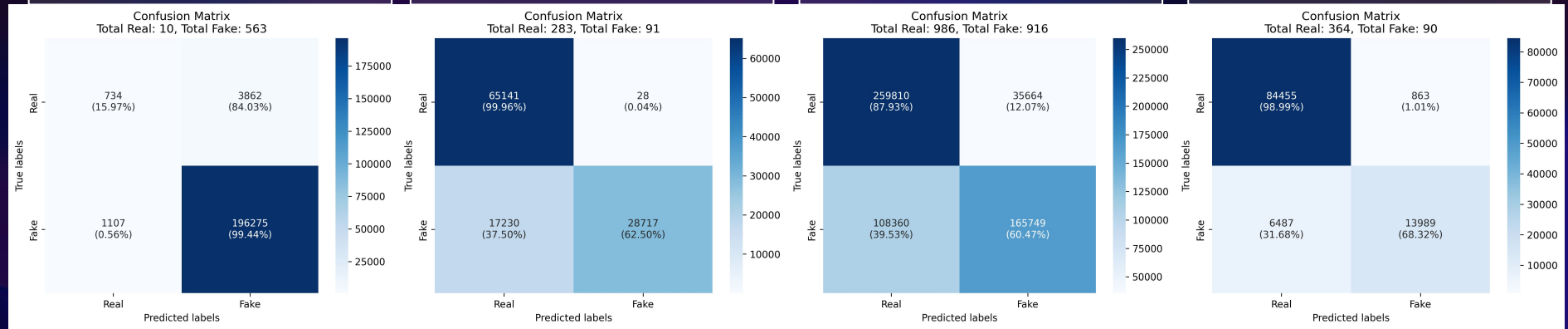
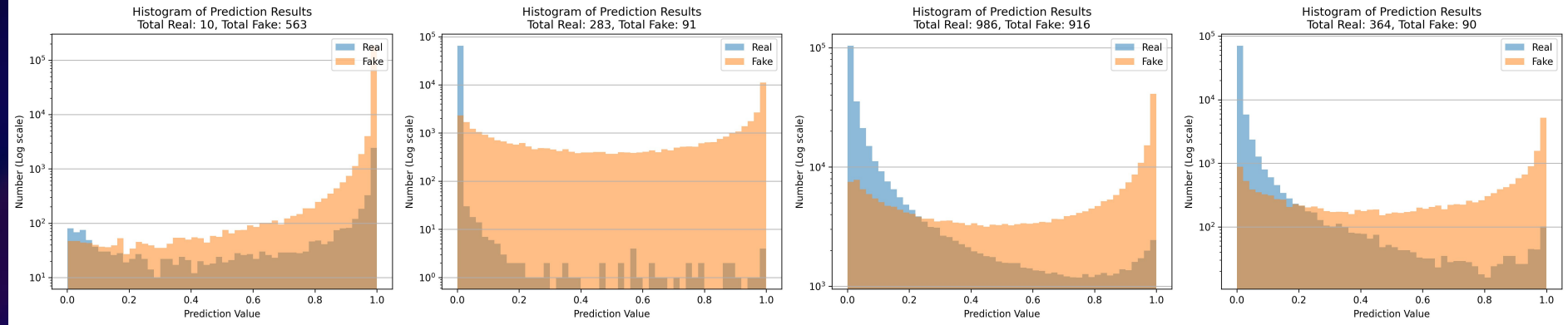
APPENDIX

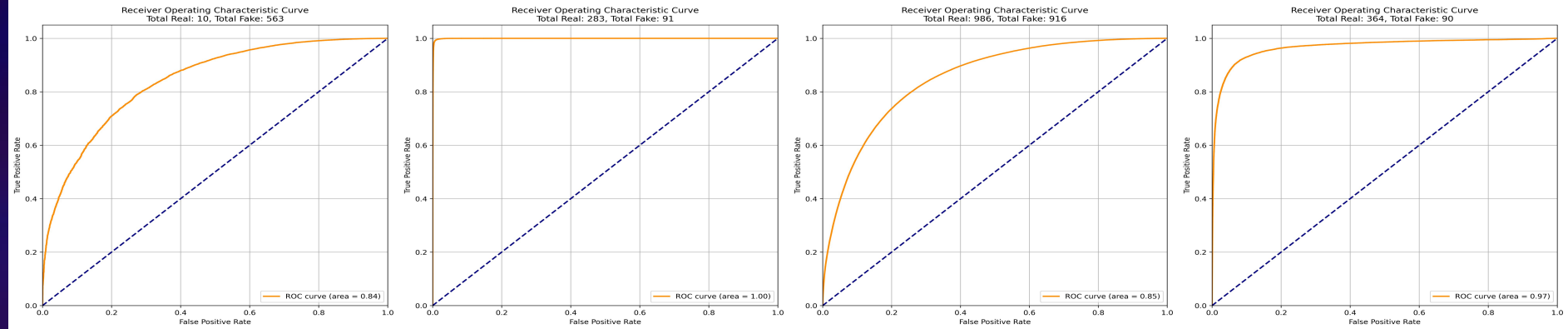
DeepFake Detection Results: Face

DM-FD-1 Detector Results on Datasets (No Augmentation)

CelebDF	Deeper Forensics	DFDC	FFIW





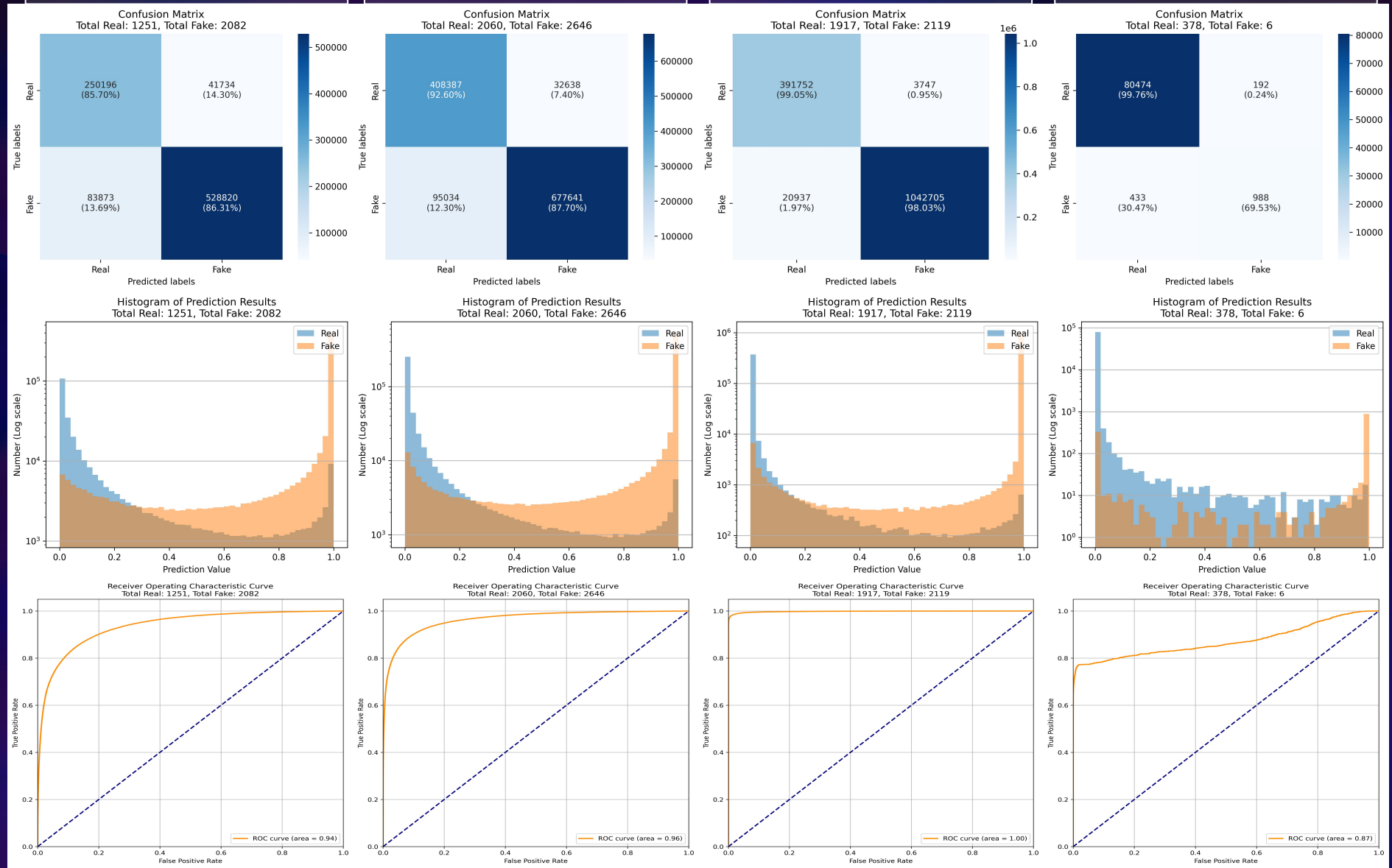


APPENDIX

DeepFake Detection Results: Face

DM-FD-1 Detector Results on Face Size (No Augmentation)

128	256	512	1024



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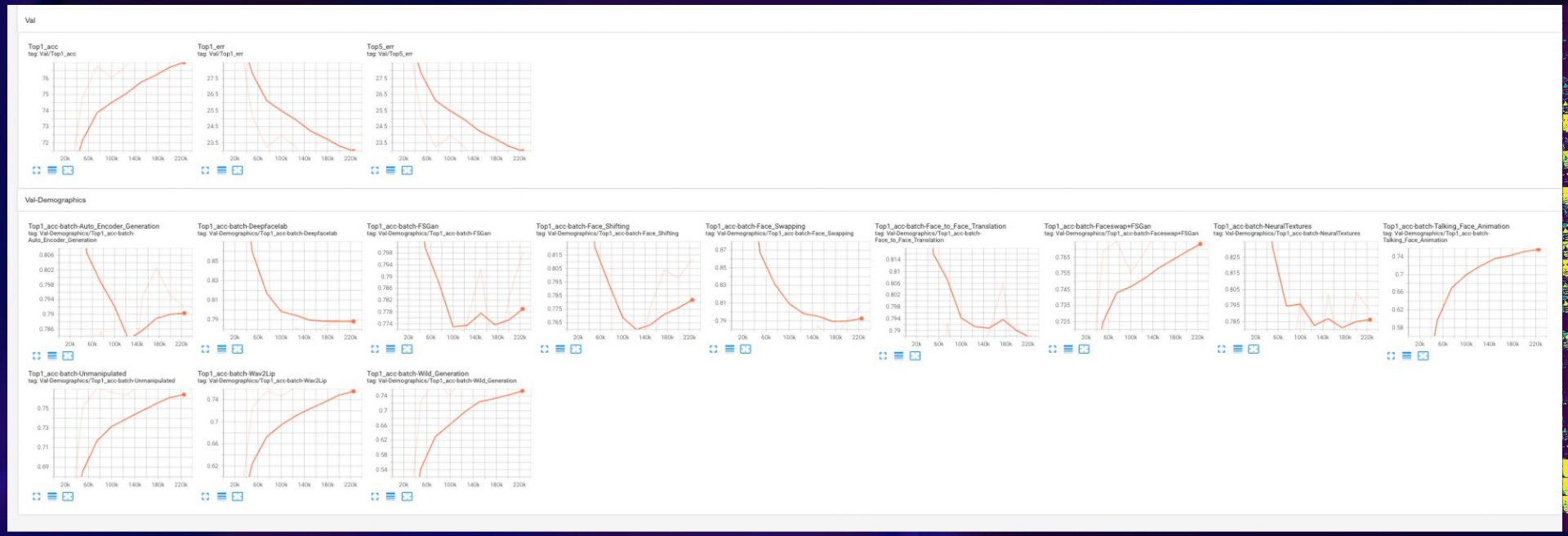
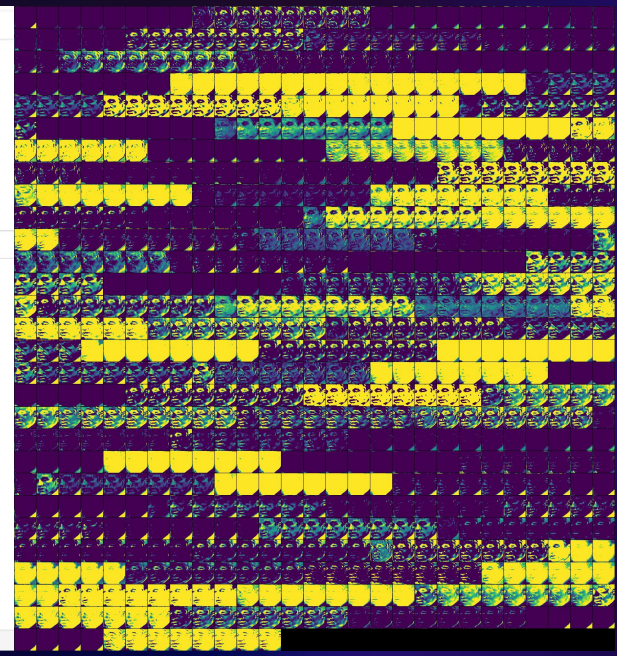
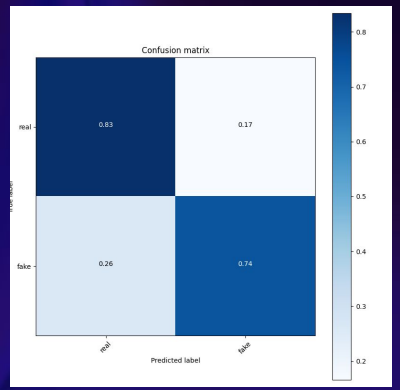
APPENDIX

DeepFake Detection Results: Face

RMViT Detector Training Logs (w/ Augmentation)







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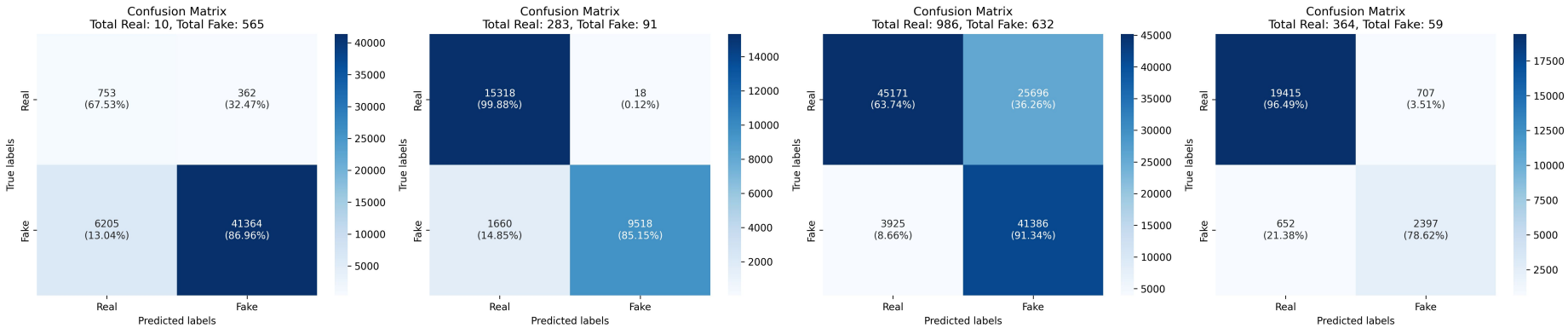
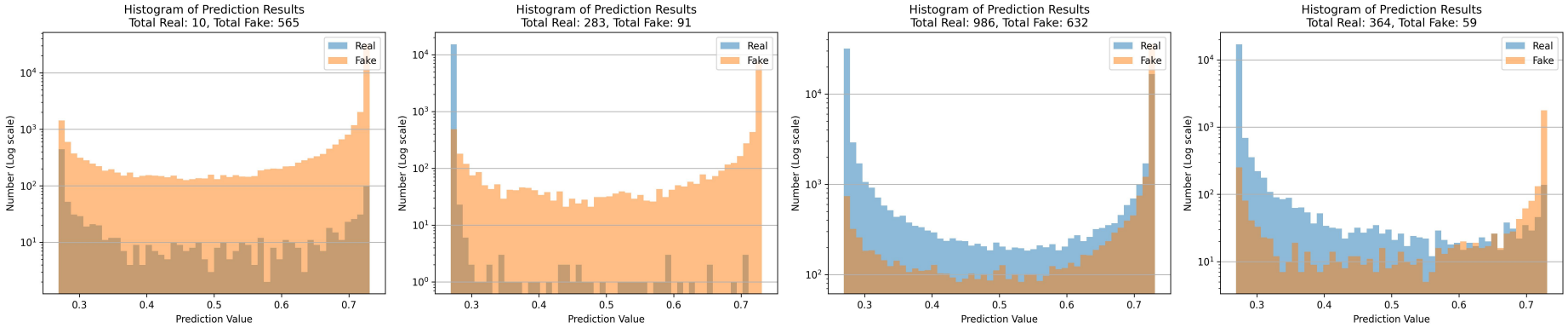
APPENDIX

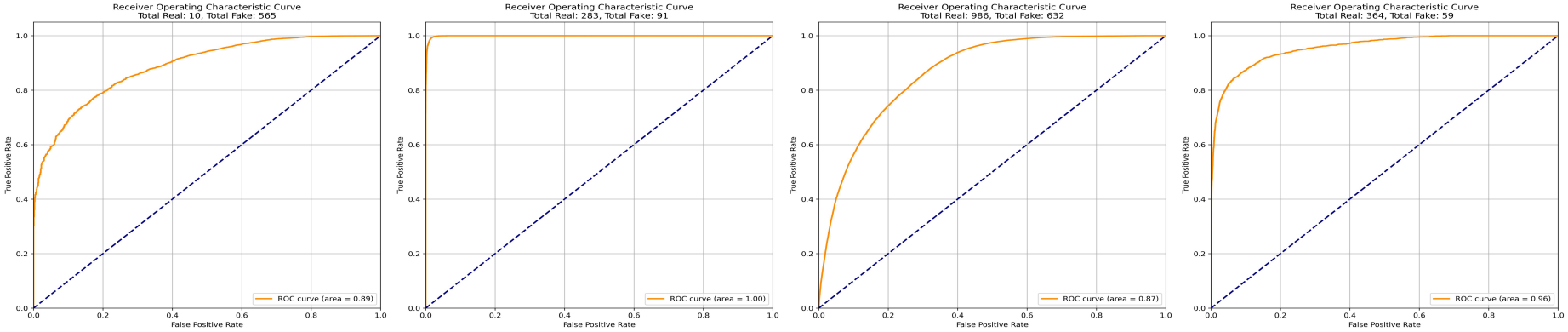
DeepFake Detection Results: Face

DM-FD-2 Detector Results on Datasets (No Augmentation)

CelebDF	Deeper Forensics	DFDC	FFIW





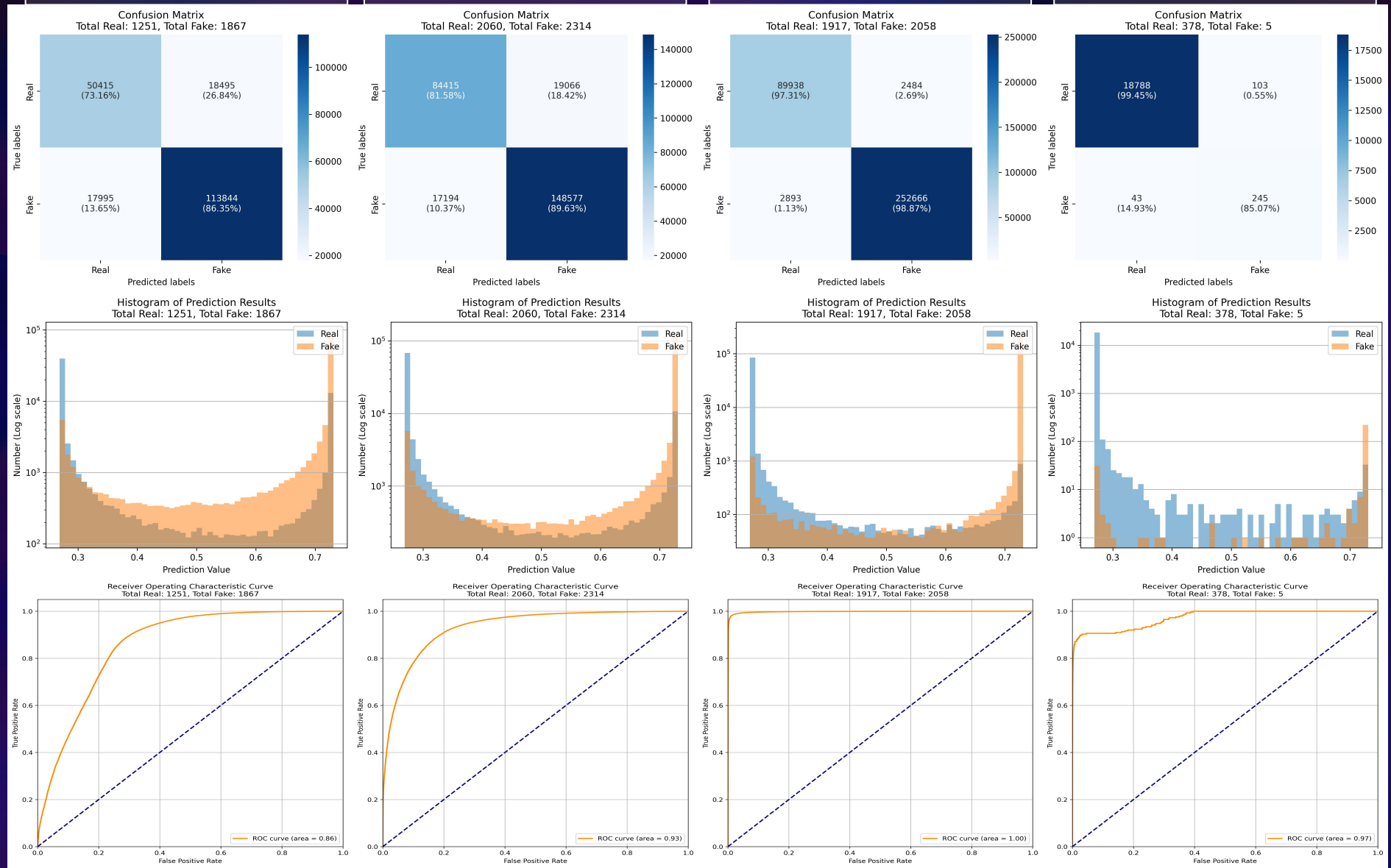


APPENDIX

DeepFake Detection Results: Face

DM-FD-2 Detector Results on Face Size (No Augmentation)

128	256	512	1024



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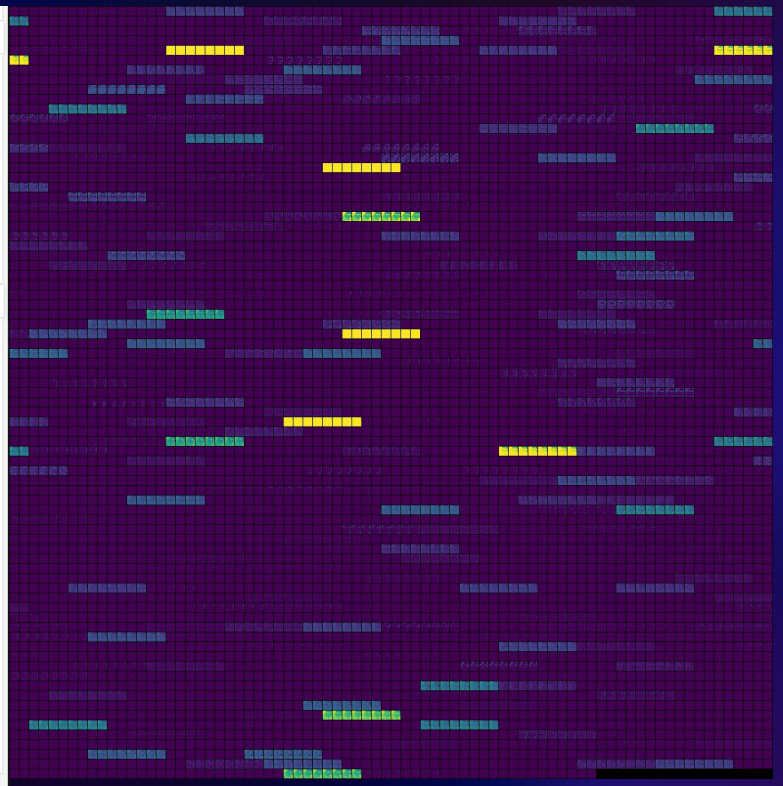
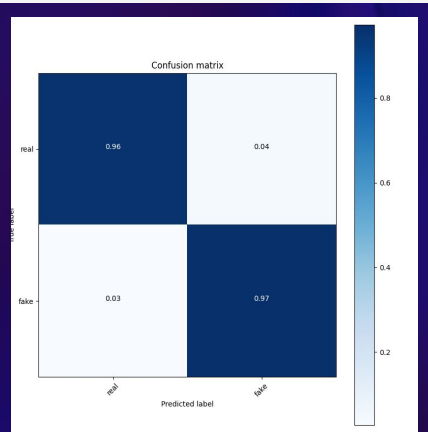
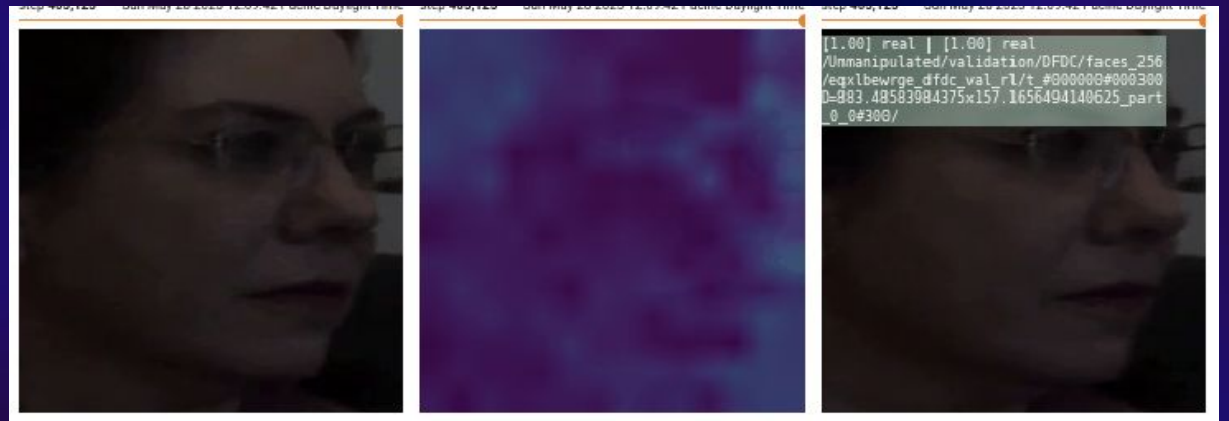
APPENDIX

DeepFake Detection Results: Face

DM-FD-3 Detector Training Logs (No Augmentation)







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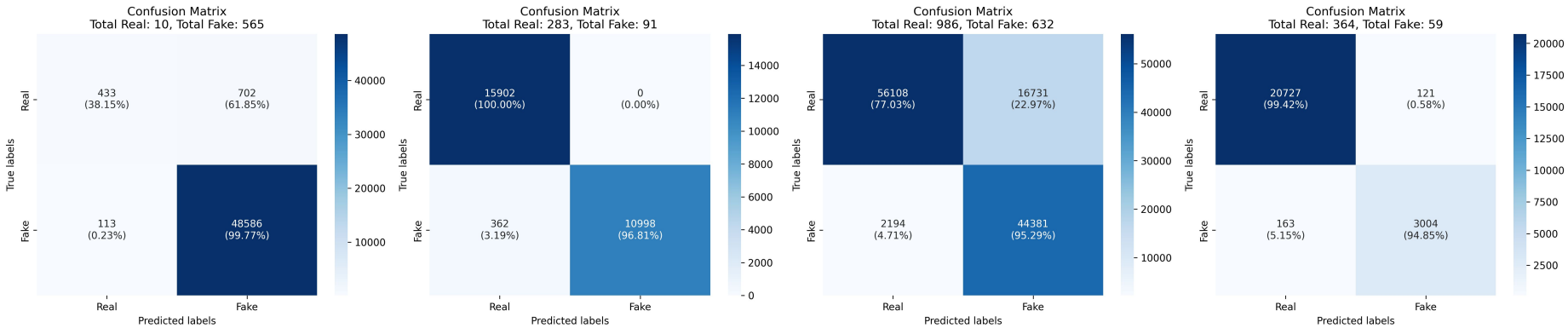
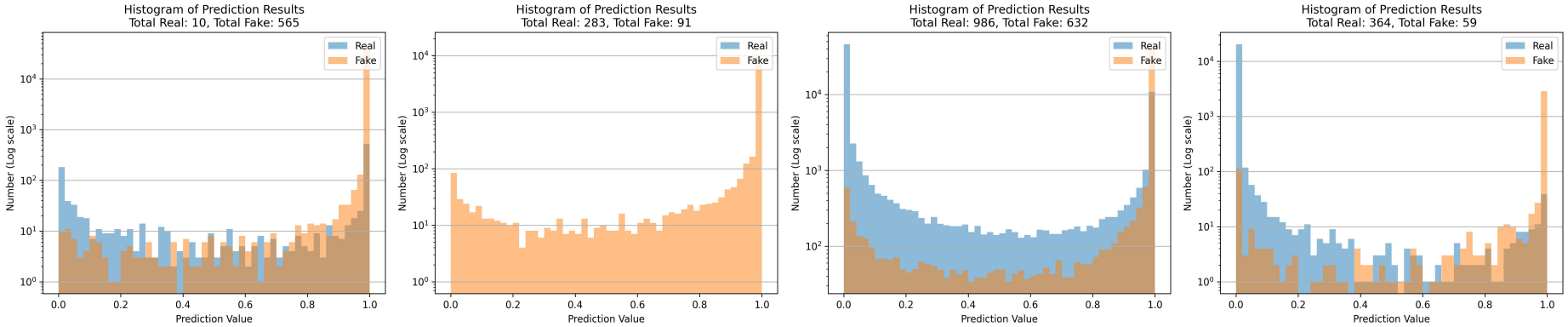
APPENDIX

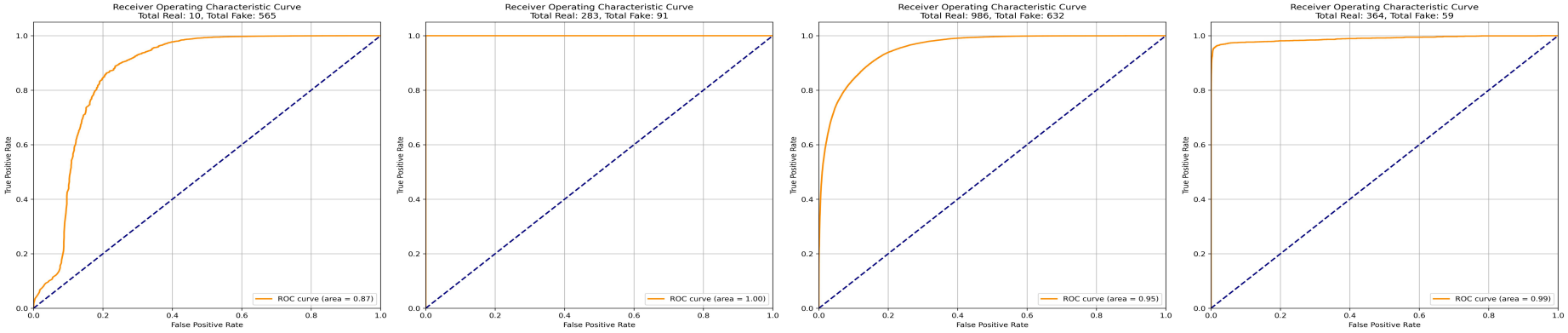
DeepFake Detection Results: Face

DM-FD-3 Detector Results on Datasets (No Augmentation)

CelebDF	Deeper Forensics	DFDC	FFIW





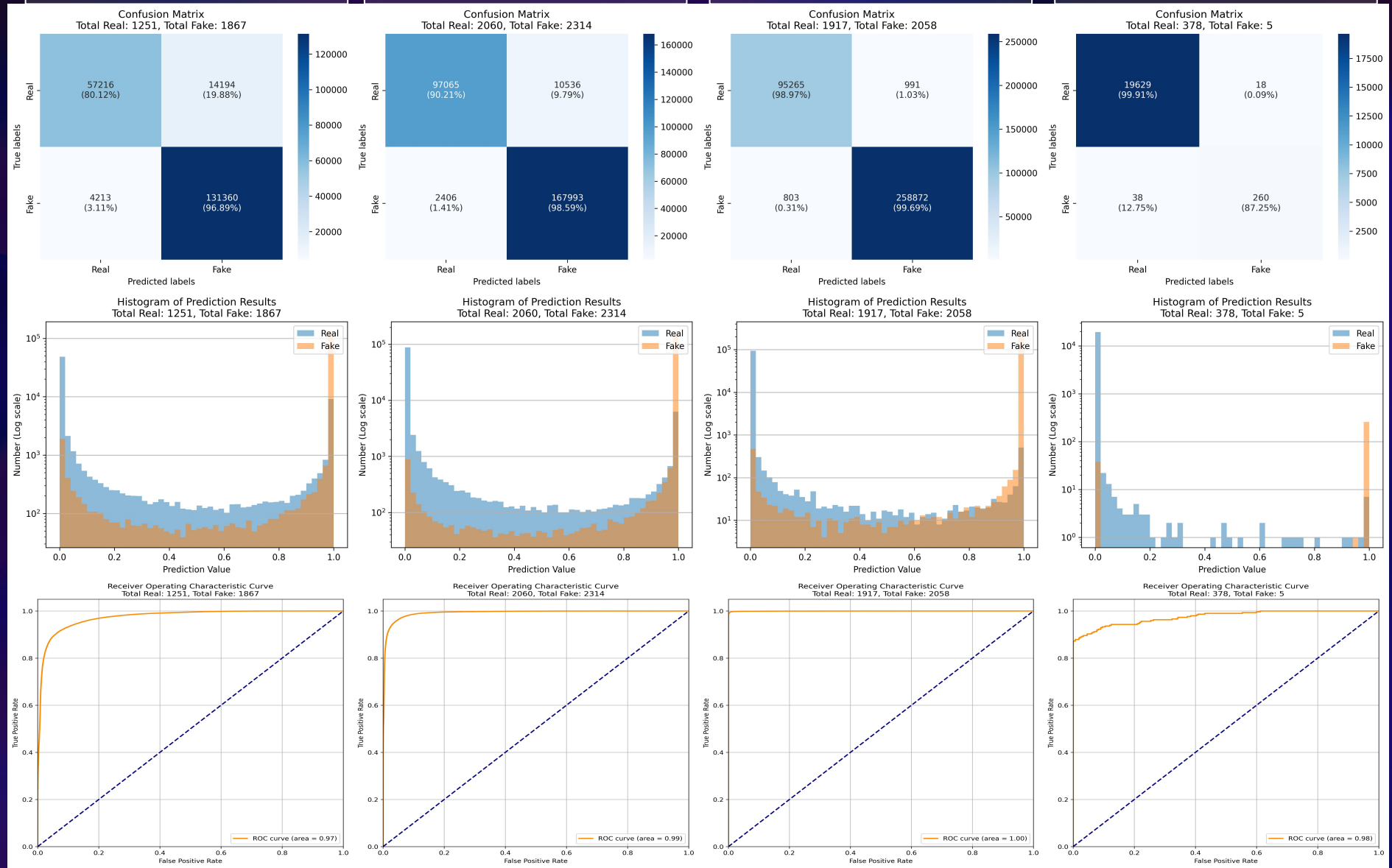


APPENDIX

DeepFake Detection Results: Face

DM-FD-3 Detector Results on Face Size (No Augmentation)

128	256	512	1024



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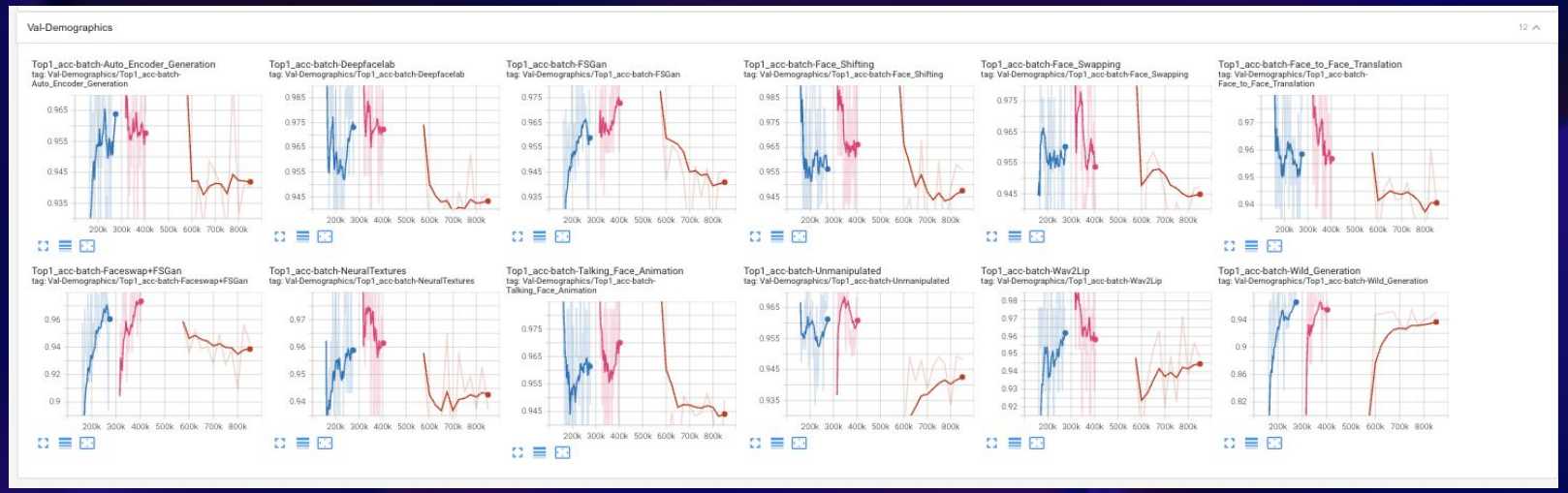
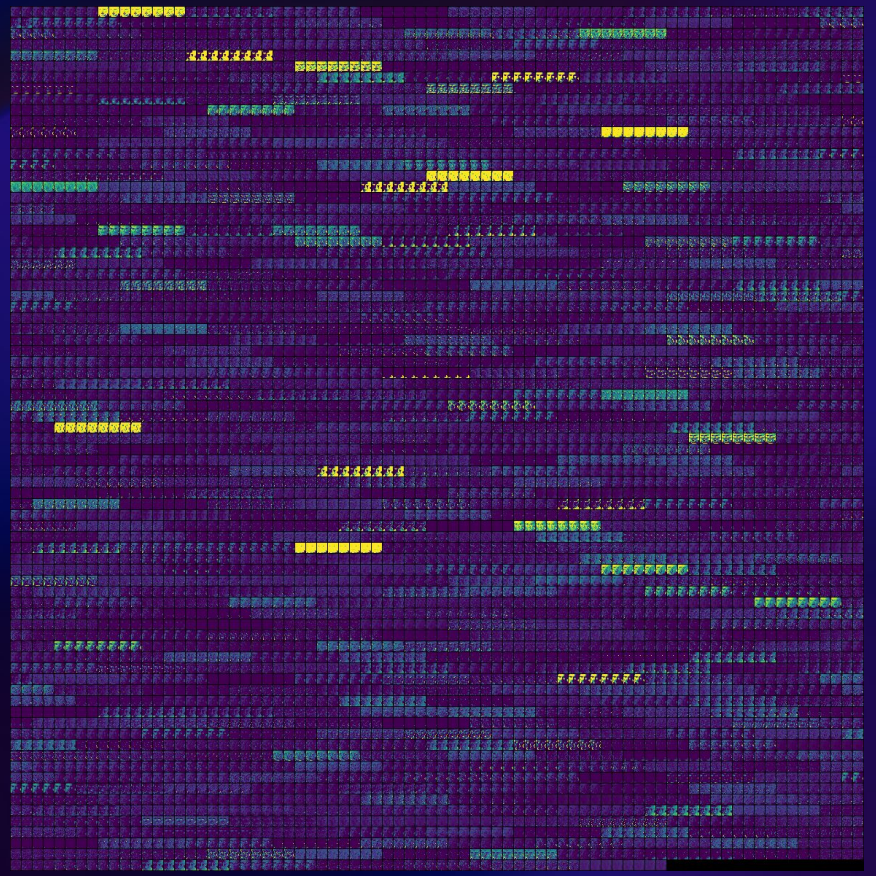
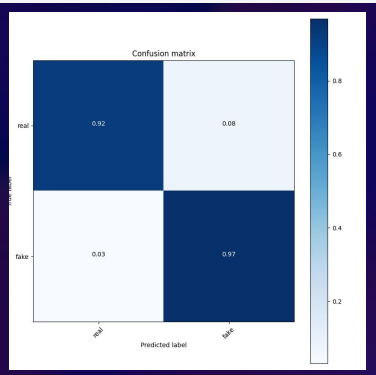
APPENDIX

DeepFake Detection Results: Face

DM-FD-3 Detector Training Logs (With Augmentation)







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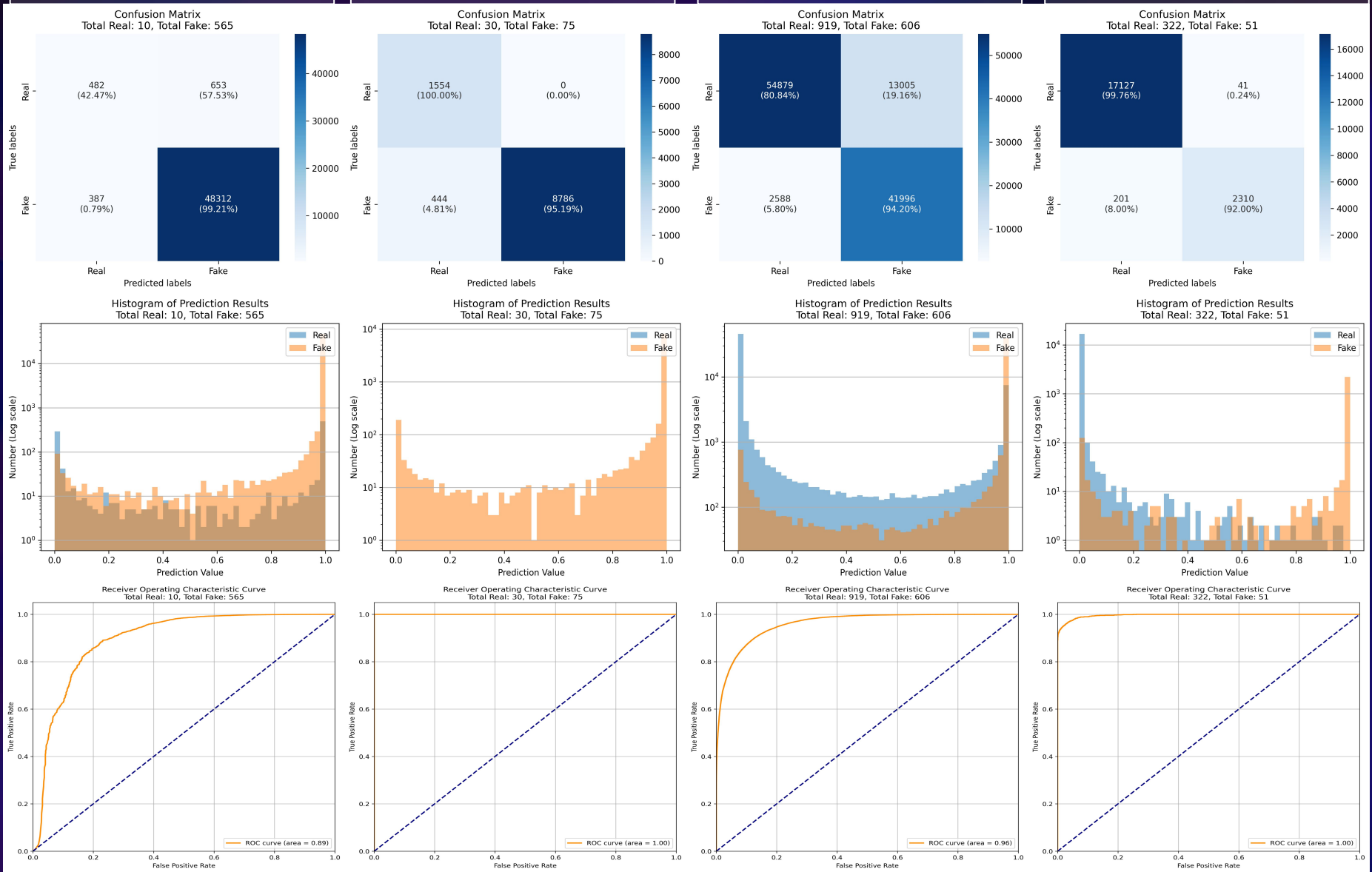
APPENDIX

DeepFake Detection Results: Face

DM-FD-3 Detector Results on Datasets (w/ Augmentation)

CelebDF	Deeper Forensics	DFDC	FFIW

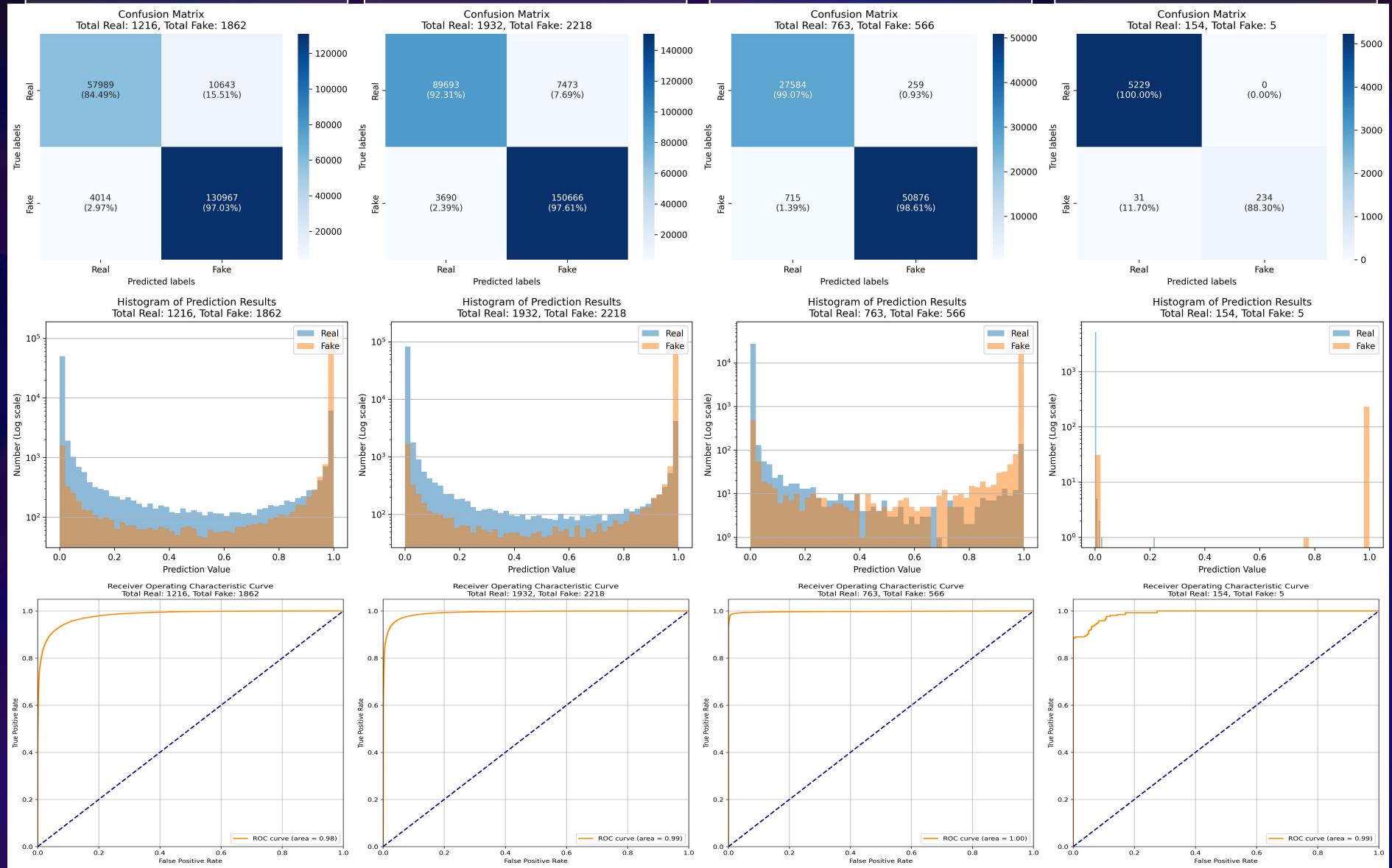


APPENDIX

DeepFake Detection Results: Face

DM-FD-3 Detector Results on Face Size (w/ Augmentation)

128	256	512	1024



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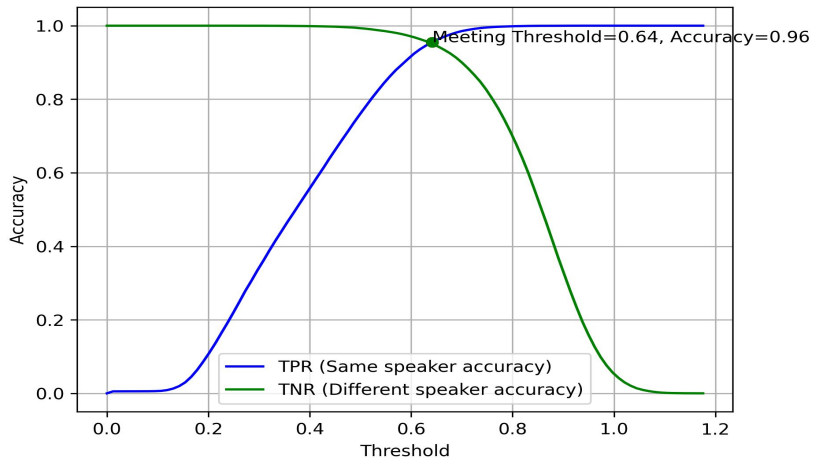
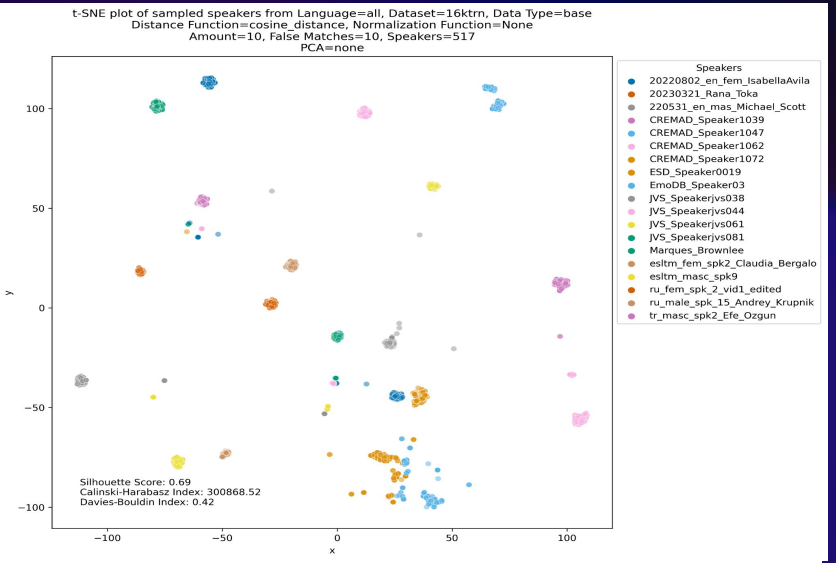
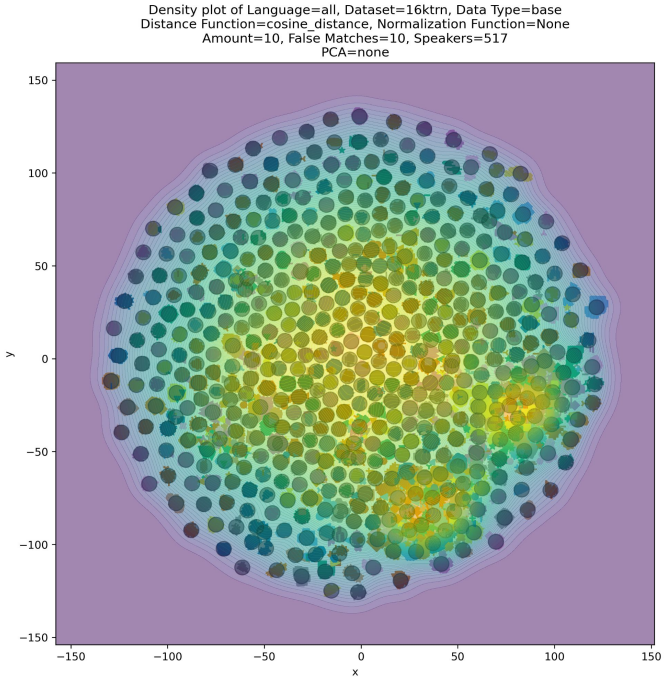
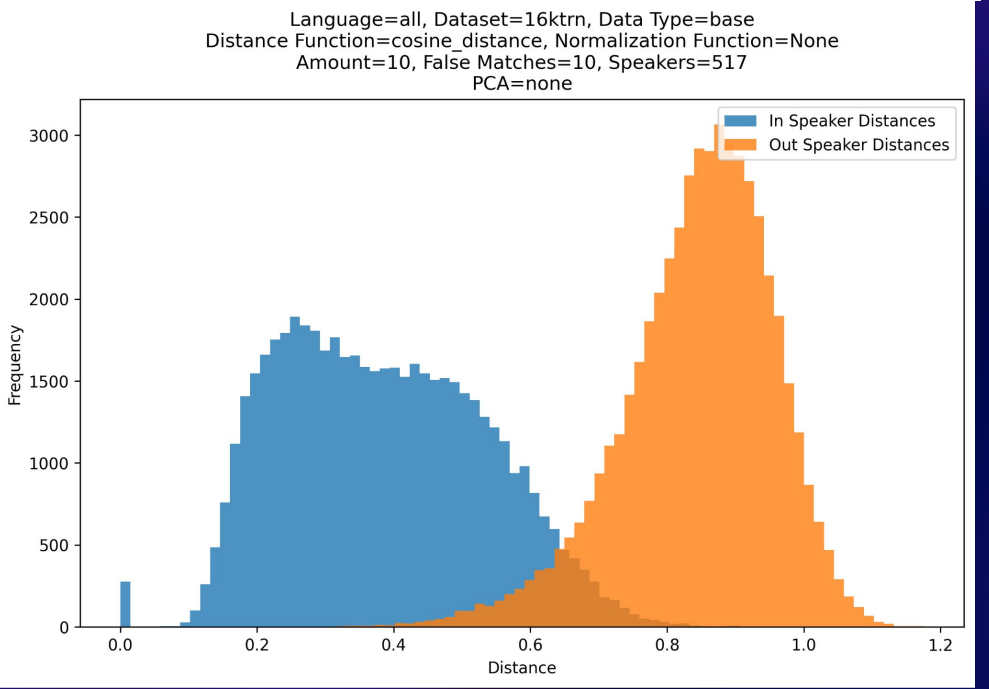
APPENDIX

Voice Identity Detection









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