

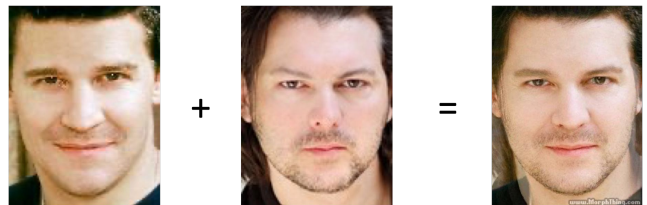
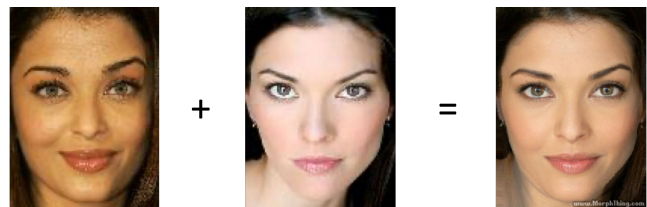
# DF-Platter: Multi-face Heterogeneous Deepfake Dataset

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Indian Institute of Technology, Jodhpur



**Paper Tag**  
**WED-AM-144**

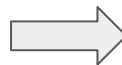
# Deepfake: from Infancy to Adulthood



Subject 1

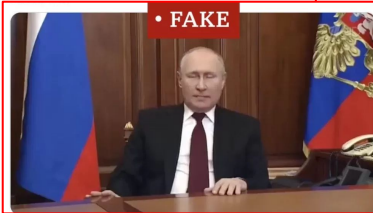
Subject 2

Morphed



## Man Loses Rs. 5 Cr to a Scam Deepfake AI Call Posing as His Close Friend

By Dipanita Bhowmick May 25, 2023



## SBF Deepfake Scam Offers Users 'Compensation' for FTX Collapse

A deepfake video of Sam Bankman-Fried points to an apparent scam website that potentially steal funds from users.

Nov 22, 2022  
3 min read

Andrew Hayward



I was in deepfake porn, fans think it's real — it can happen to anyone

By Asia Grace

February 24, 2023 | 1:37pm

## Canadian Man Jailed for Creating AI Child Porn in Country's First Ever Case

Fake pornography, women and child abuse, and fake newspolitical misinformation.

DogeDesigner  
@cb\_doge · Follow

103

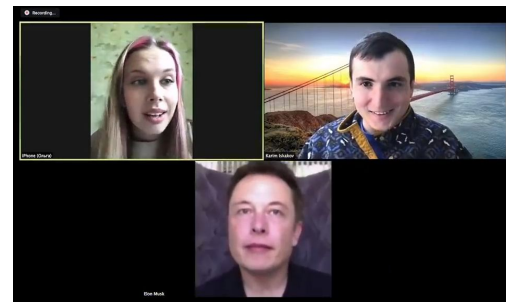
Beware of Elon Musk Deepfake Crypto Scams which are being promoted on YouTube.

Do not fall for such scams. @elonmusk will never ask you to send any crypto.



Generally shared across platforms with compression, thereby causing low quality variations.

# What are we contributing?



Properties	Existing Work	DF-Platter Dataset (Ours)
Multi-subject Deepfakes	✗	✓
Low-Resolution Deepfakes	✗	✓
Occluded Deepfakes	✗	✓

# Deepfake: Related Work

Dataset	Real Videos	Fake Videos	Total Videos	Total Subjects	Real Source	Multiple faces per image/video	Face Occlusion	Low Resolution	Annotations
FF++ [1]	1,000	4,000	5,000	N/A	YouTube	X	X	X	X
Celeb-DF [2]	590	5,639	6,229	59	YouTube	X	X	X	X
UADFV [3]	49	49	98	49	YouTube	X	X	X	X
DFDC [4]	23,654	104,500	128,154	960	Self-Recording	X	X	X	X
Deepfake-TIMIT [5]	650	320	970	32	VidTIMIT	X	X	✓	X
KoDF [6]	62,166	175,776	237,942	403	Self-Recording	X	X	X	X
WildDeepfake [7]	707	707	1414	N/A	Internet	X	X	X	X
OpenForensics [8]	45,473	70,325	115,798	N/A	Google Open Images	✓	✓	X	X
DeePhy [9]	100	5040	5140	N/A	YouTube	X	✓	X	✓
<b>DF-Platter (Ours)</b>	<b>764</b>	<b>132,496</b>	<b>133,260</b>	<b>454</b>	<b>YouTube</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>

[1] FF++ - Rössler, Andreas, et al. "FaceForensics++: Learning to Detect Manipulated Facial Images." IEEE/CVF ICCV 2019.

[2] Celeb-DF- Li, Yuezun, et al. "Celeb-DF: A Large-scale Challenging Dataset for DeepFake Forensics." IEEE/CVF CVPR 2020.

[3] UADFV - Yang, Xin, et al. "Exposing Deep Fakes Using Inconsistent Head Poses." ICASSP 2019.

[4] DFDC - Dolhansky, Brian, et al. "The DeepFake Detection Challenge (DFDC) Dataset." arXiv 2020. arXiv preprint arXiv:2006.07397.

[5] Deepfake-TIMIT - Korshunov, Pavel, et al. "Deepfakes: a new threat to face recognition? assessment and detection." arXiv 2018. arXiv preprint arXiv:1812.08685.

[6] KoDF - Kwon, Patrick, et al. "Kodf: A large-scale korean deepfake detection dataset." IEEE/CVF ICCV, 2021.

[7] WildDeepfake - Bojia, Zi, et al. "WildDeepfake: A Challenging Real-World Dataset for Deepfake Detection." ACM MM, 2020.

[8] OpenForensics - Le, Trung-Nghia, et al. "OpenForensics: Large-Scale Challenging Dataset for Multi-Face Forgery Detection and Segmentation In-the-Wild." IEEE/CVF ICCV, 2021.

[9] DeePhy - Narayan, Kartik, et al. "DeePhy: On Deepfake Phylogeny." IEEE/IAPR IJCB 2022.

# What is missing in deepfake research?



Single-subject deepfakes

GT: Fake



Multi - Face deepfakes

Gender: M  
Skin: 4  
Beard: True  
Moustache: True  
Age: Adult  
GT: Fake

Intra deepfakes

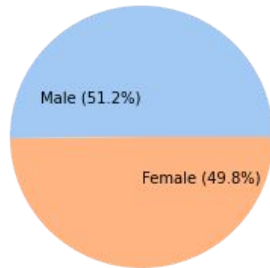
Gender: M  
Skin: 3  
Beard: True  
Moustache: True  
Age: Adult  
GT: Fake

Low-Resolution deepfakes

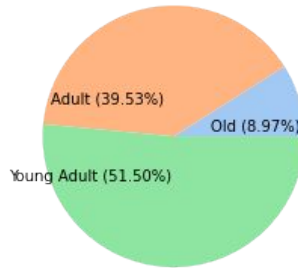
Gender: M  
Skin: 3  
5o'Clock Shadow: True  
Moustache: True  
Age: Young Adult  
GT: Fake

# DF-Platter Dataset

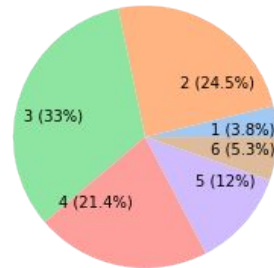
- Dataset link - <http://www.iab-rubric.org/df-platter-database>
- Size: ~400 GB
- Total videos: 133,260 (for each compression)
- Each video is of approx. 20 seconds with 25 frames per second



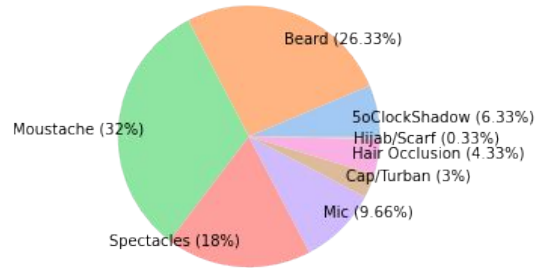
Gender



Age



Skin tone  
(In Fitzpatrick Scale)



Occlusion

# DF-Platter Dataset

- Dataset Statistics

Sets	Resolution		Compression			Protocol	
	Low	High	Raw	C23	C40	Train	Test
Set A	65,649	65,649	✓	✓	✓	✓	✓
Set B	500	500	✓	✓	✓	✗	✓
Set C	481	481	✓	✓	✓	✗	✓
Total	66,630	66,630	✓	✓	✓		

- Dataset Generation Techniques

- FSGAN [1]
- FaceShifter [2]
- FaceSwap [3]

[1] FSGAN - Nirkin, Yuval, et al. "FSGAN: Subject Agnostic Face Swapping and Reenactment." IEEE/CVF ICCV 2019.

[2] FaceShifter - Li, Lingzhi, et al. "FaceShifter: Towards High Fidelity And Occlusion Aware Face Swapping." IEEE/CVF CVPR 2020.

[3] FaceSwap - <https://github.com/MarekKowalski/FaceSwap/> [Accessed: 27- April-2022]



REAL



FAKE



FAKE

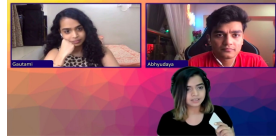


SET A

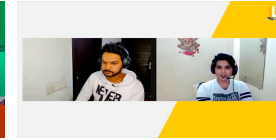
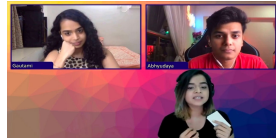
REAL



FAKE



FAKE



SET B

SET C

# Benchmark Settings

## Deepfake detection models:

- MesoNet [1]
- Meso-Inception [2]
- FWA [3]
- Xception [4]
- DSP-FWA [5]
- Capsule [6]

## Evaluation Metrics:

- ROC-AUC score
- Face-wise Accuracy
- Frame-level Accuracy
- Video-level Accuracy

[1] MesoNet - Afchar, Darius, et al. "Mesonet: a compact facial video forgery detection network." IEEE WIFS 2018.

[2] MesoInception - Afchar, Darius, et al. "Mesonet: a compact facial video forgery detection network." IEEE WIFS 2018.

[3] FWA - Li, Yuezun, and Siwei Lyu. "Exposing deepfake videos by detecting face warping artifacts." IEEE/CVF CVPRw 2019..

[4] Xception - Chollet, François. "Xception: Deep learning with depthwise separable convolutions." IEEE/CVF CVPR. 2017.

[5] DSP-FWA - He, Kaiming, et al. "Spatial pyramid pooling in deep convolutional networks for visual recognition." IEEE TPAMI 37.9 (2015): 1904-1916.

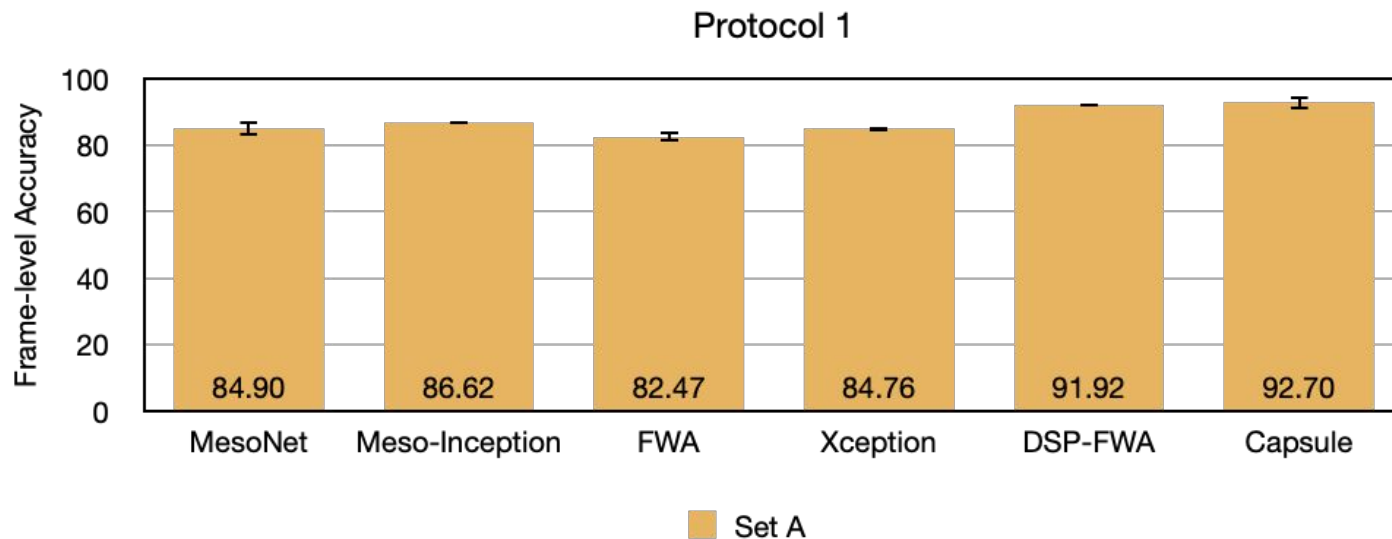
[6] Capsule - Nguyen, H. H., J. Yamagishi, and I. Echizen. "Use of a capsule network to detect fake images and videos." ICASSP 2019.

# Benchmark Experiments

- **Protocol 1-** Single-face Deepfake Detection
- **Protocol 2-** Multi-face Deepfake Detection
- **Protocol 3-** Cross-Resolution and Cross-Compression Deepfake Detection

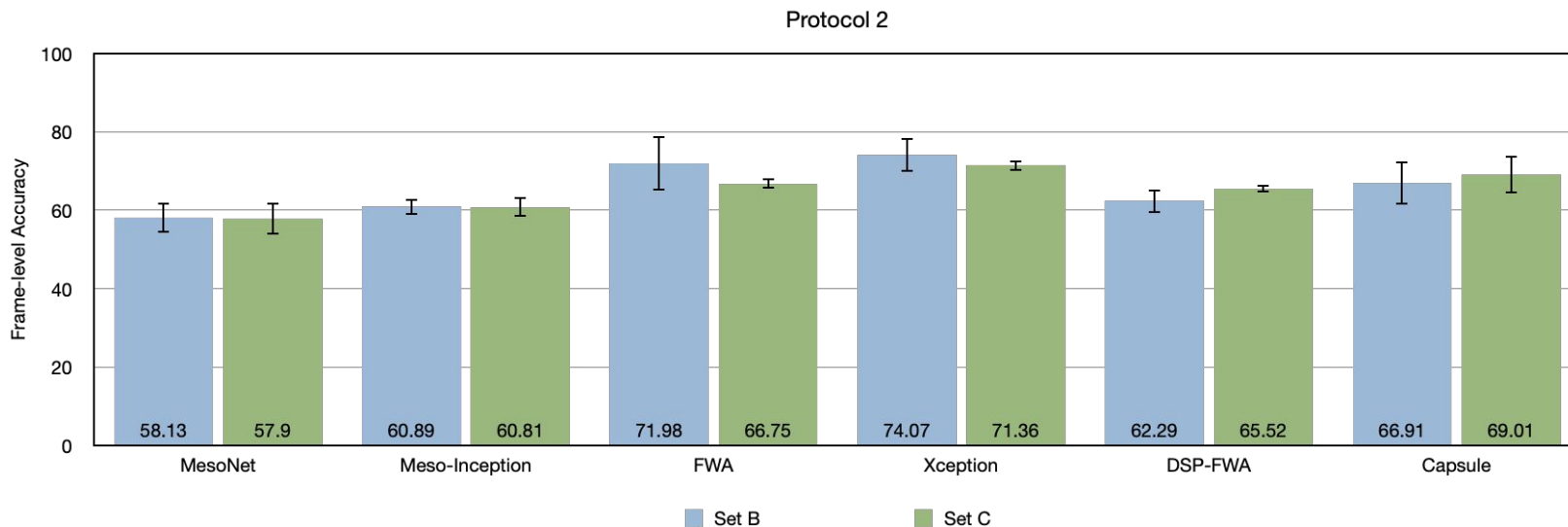
# Benchmark Results: Protocol 1

- Trained on Set A (c0, HR), Tested on Set A (c0, HR)



# Benchmark Results: Protocol 2

- Trained on Set A (c0, HR), Tested on Sets B and C (c0, HR)

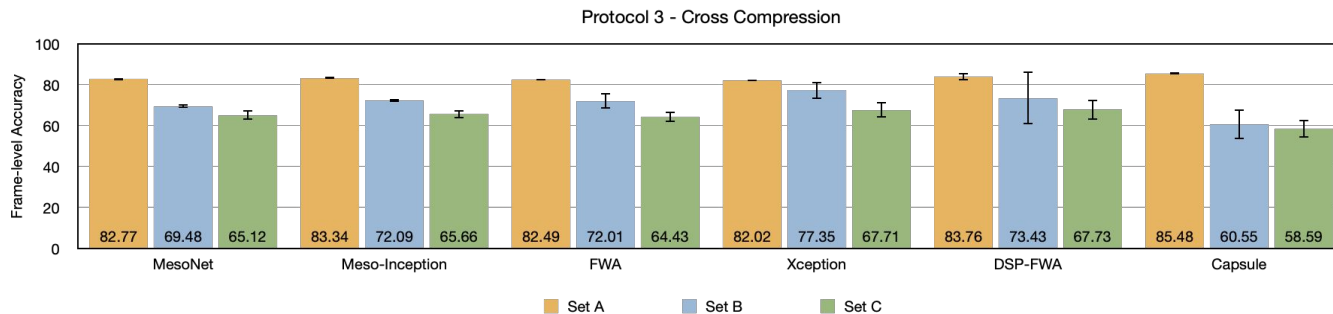
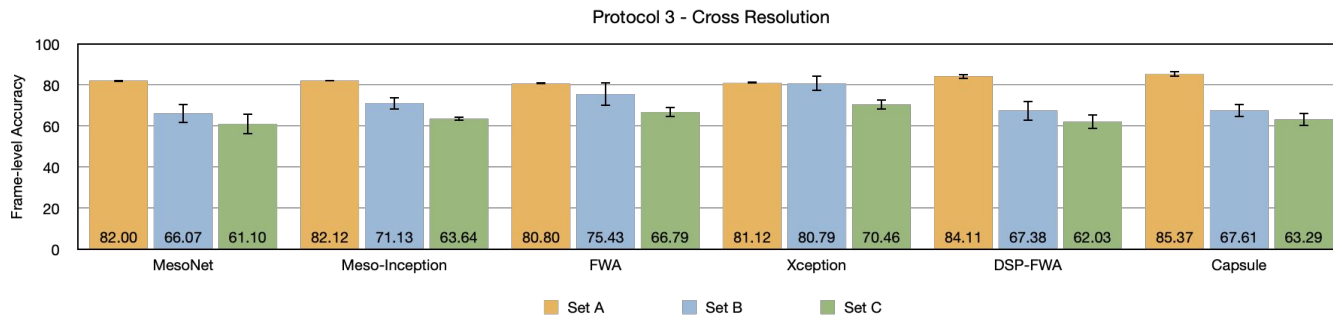


# Benchmark Results: Protocol 2



# Benchmark Results: Protocol 3

- Cross-resolution - Trained on Set A (c0, HR), Tested on all Sets (c0, LR)
- Cross-compression - Trained on Set A (c23, HR), Tested on all Sets (c40, HR)



# Benchmark Results: Protocol 3

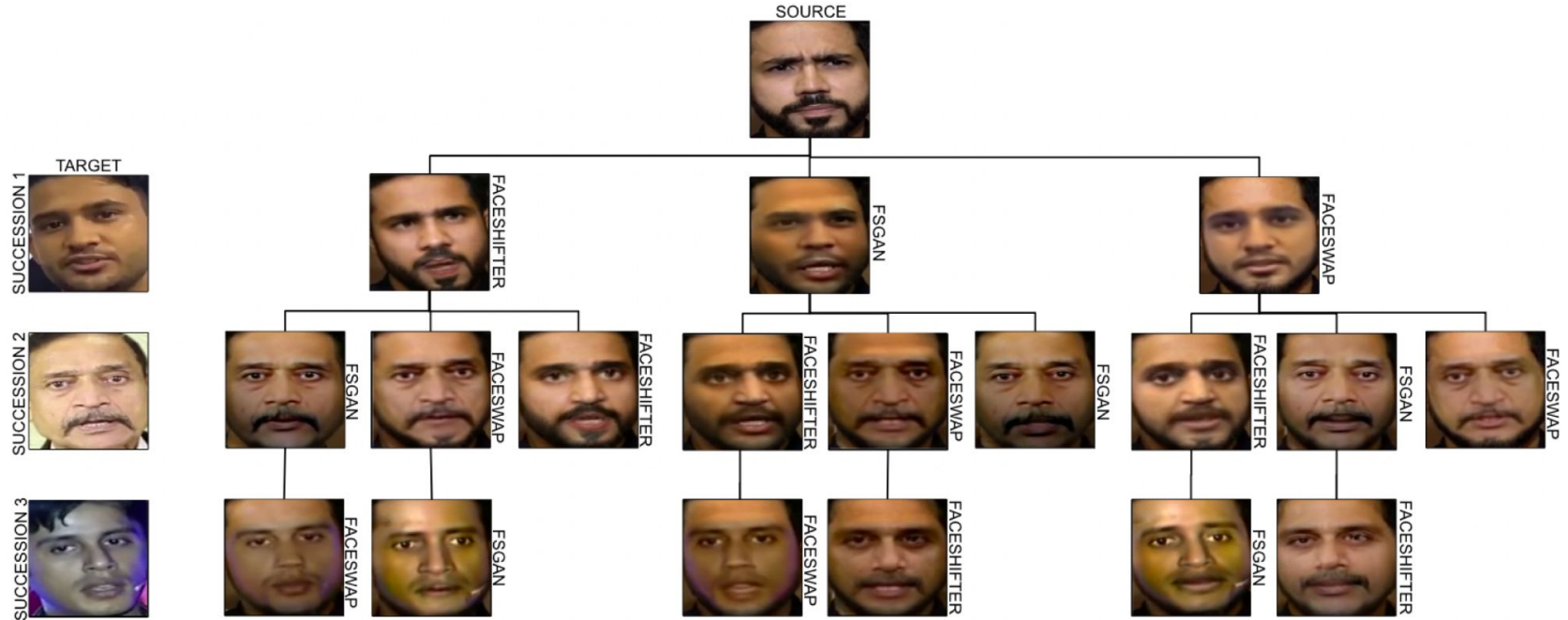




# Observations and Path Forward

- We introduce the large-scale DF-Platter dataset containing multi-face and low-resolution deepfakes with rich annotations for each video allowing for a thorough analysis of deepfake detection methods
- Our key observations are:
  - Existing detectors perform poorly towards detecting deepfakes containing multiple faces.
  - Existing detectors are not equipped to handle real-world detection scenarios of occlusion, compression and resolution.
- The proposed dataset will enable developing deepfake detectors in challenging environments

# Path Forward...



# Thank you.

For queries, reach out to us.

Kartik Narayan\*, Harsh Agarwal\*, Kartik Thakral\*, Surbhi Mittal\*, Mayank Vatsa, Richa Singh  
{narayan.2, agarwal.10, mittal.5, thakral.1, mvasta, richa} @ iitj.ac.in



**Paper Tag**  
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