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Towards a Diversity-Aware Deepfake Video Dataset for Improving Model Generalizability

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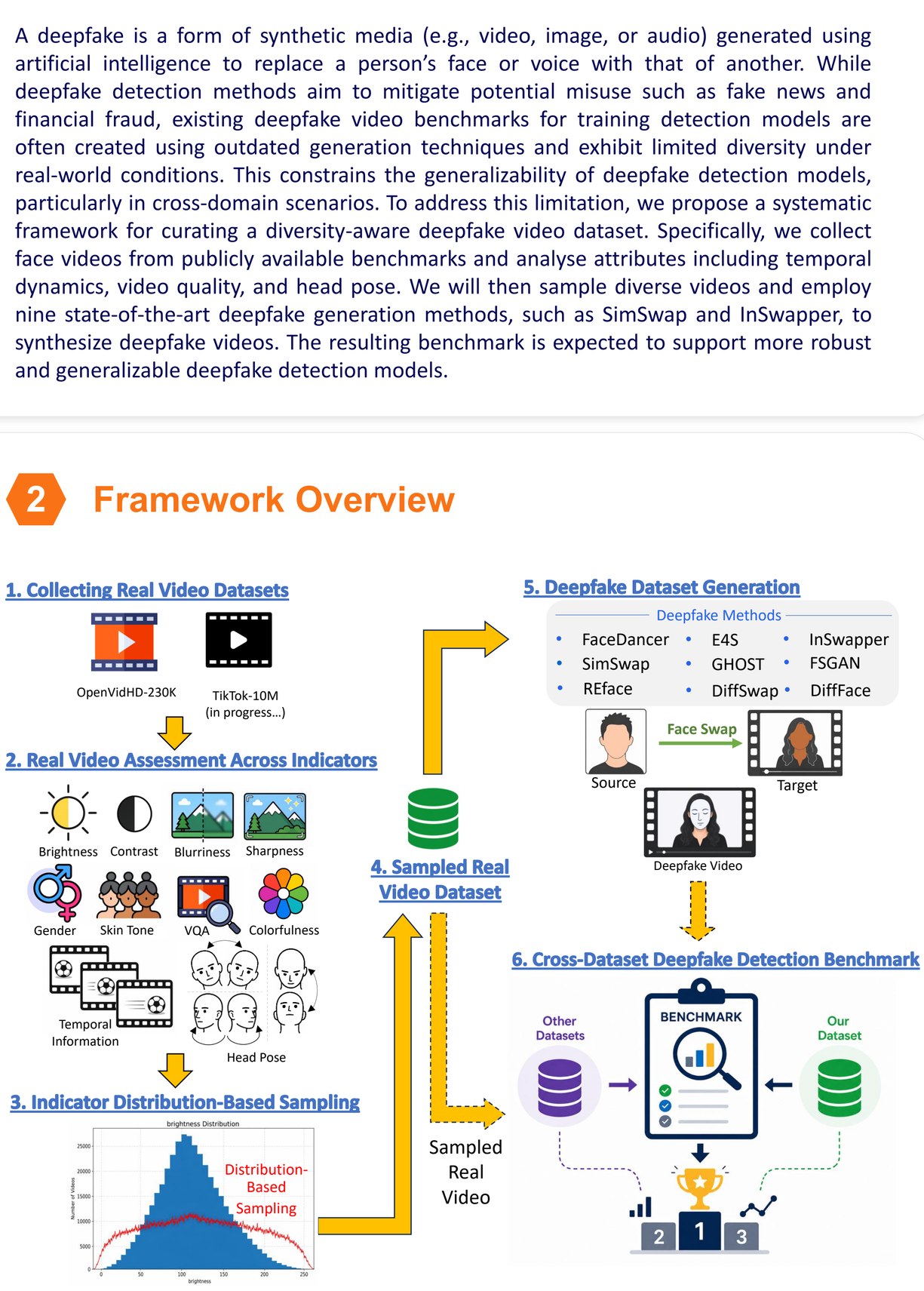
1 Abstract

A deepfake is a form of synthetic media (e.g., video, image, or audio) generated using artificial intelligence to replace a person's face or voice with that of another. While deepfake detection methods aim to mitigate potential misuse such as fake news and financial fraud, existing deepfake video benchmarks for training detection models are often created using outdated generation techniques and exhibit limited diversity under real-world conditions. This constrains the generalizability of deepfake detection models, particularly in cross-domain scenarios. To address this limitation, we propose a systematic framework for curating a diversity-aware deepfake video dataset. Specifically, we collect face videos from publicly available benchmarks and analyse attributes including temporal dynamics, video quality, and head pose. We will then sample diverse videos and employ nine state-of-the-art deepfake generation methods, such as SimSwap and InSwapper, to synthesize deepfake videos. The resulting benchmark is expected to support more robust and generalizable deepfake detection models.

2 Framework Overview



3 Motivation

Deepfake Detection Challenges

- Limited dataset diversity
- Limited face-swap method diversity
- Limited attribute analysis
- Weak cross-domain generalization

Background

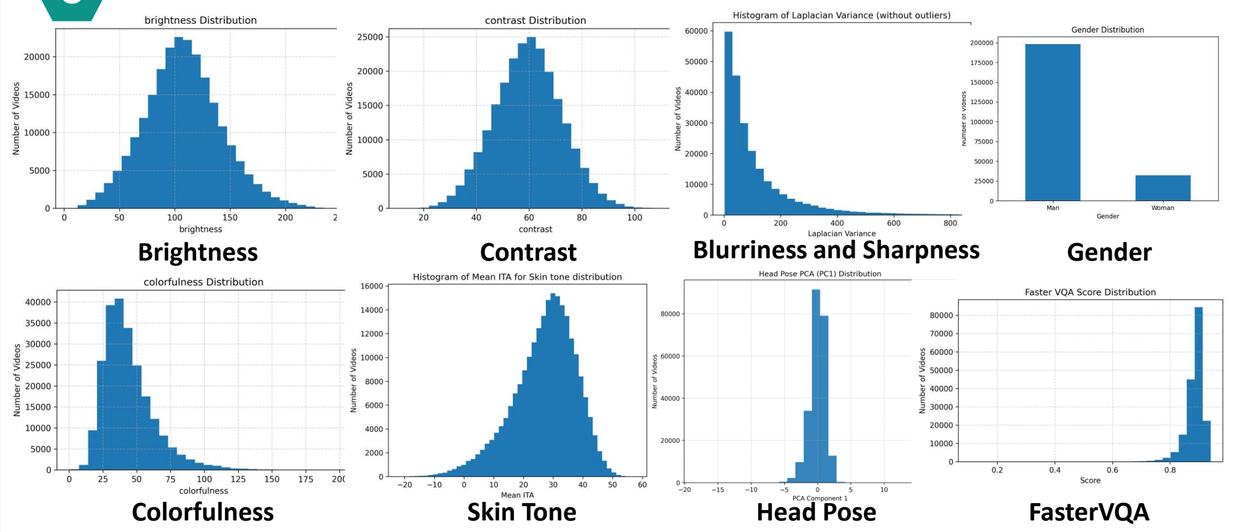
- Realistic face swaps
- Biometric security risks (e-KYC, mobile banking)
- Impersonation and identity theft
- Misinformation threats (fake news, fake media)

Solution

- Diverse Video Content
- Diverse Indicators
- Diversity-Aware Deepfake Dataset
- Sampled Benchmark Dataset

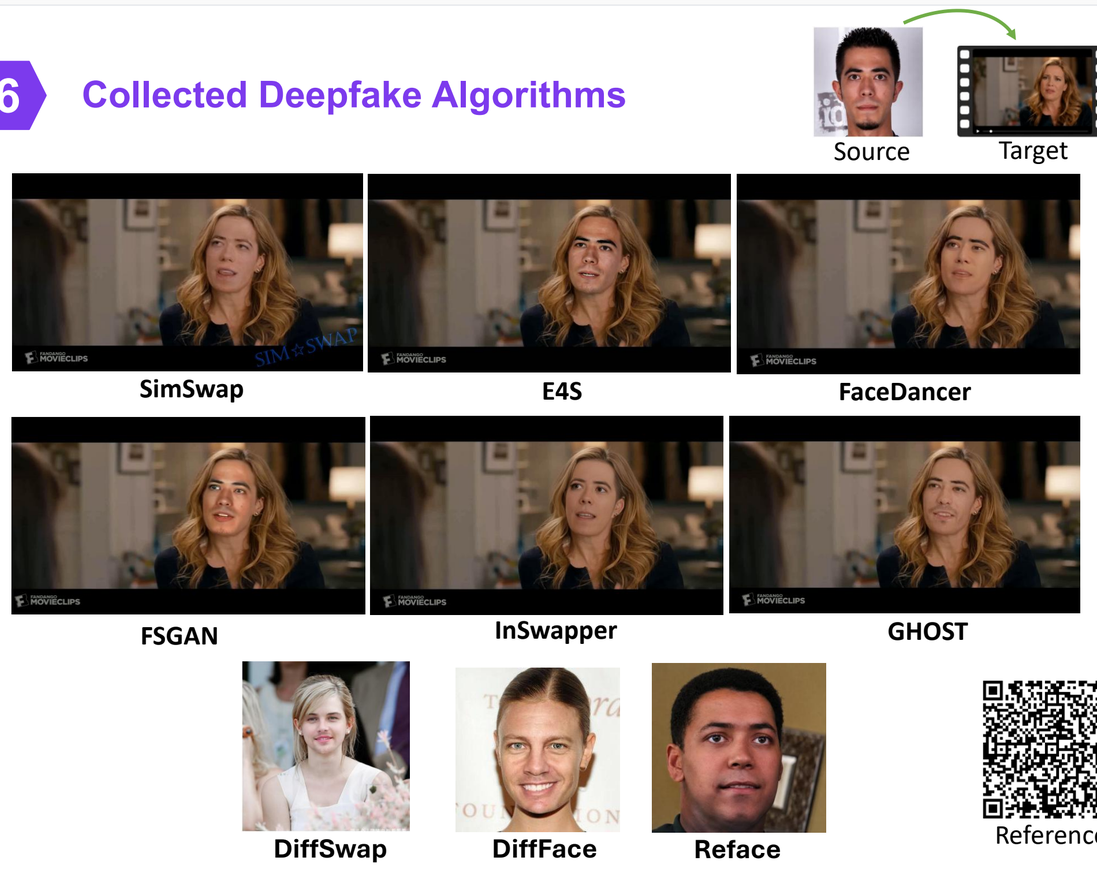
4 Real Video Assessment Across Indicators

5 Real Video Distribution Across Indicators for Dataset Diversity Analysis



OpenVidHD-230K lacks diversity in some indicators (e.g., FasterVQA and gender). Therefore, TikTok-10M videos will be added to obtain a more balanced and diverse distribution after sampling.

6 Collected Deepfake Algorithms



7 Conclusion & Future Work

Conclusion

- Diverse real and deepfake video dataset
- Multi-indicator-based diversity analysis
- Cross-domain benchmark for deepfake detection

Future Work

- Collect more real videos
- Sampling across indicators
- Improve model generalization

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