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show that the Discrete Cosine transform can improve deepfake detection by capturing spectral features of individual frames. In this work, we build a multimodal network that explores new features to detect deepfake videos, achieving 61.95% accuracy on the Facebook Deepfake Detection Challenge (DFDC) dataset.

***Index Terms*—deepfake detection, deep learning, multi-modal, computer vision**

I. Introduction

Recent advances in synthetic media have posed a great threat for individual privacy, trust, and transparency of media. Resources that were once used for harmless activities on Snapchat and Instagram can now be used to manipulate the words of politicians [1] or feature non-consenting individuals in pornographic content [2]. While the production cost to create a photo-realistic product was once very expensive, advancements in artificial intelligence and computer vision

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is important to move deepfake detection tools in the same direction.

The recent uptick [2] in synthetic media online poses a threat of authentic content too. For example, amid health concerns and a lack of public appearances, the Gabonese President appeared in an address that appeared synthetic [4]. Following this video, a military coup was launched, some citing the presumed manipulated video as inspiration. However, the video has been evaluated by deepfake detection algorithms [4], and it has been classified as authentic. Moreover, some politicians have used the existence of deepfakes to discredit authentic content to avoid persecution and punishment for their actions [5].

As the technology has improved, evidence suggests that a human guess is not marginally better than a coin flip [6]. Though the artifacts created by some deepfake methods are sometimes easier to identify than others, these artifacts are becoming increasingly difficult for humans to detect [6]. Fortunately, some manipulation indications that the naked eye cannot detect can be identified by a computer [7]. Nonetheless,

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