DEEP **FAKE DETECTION**

**23520669**

**Phạm Lê Đăng Kha**

DeepFake Detection is the task of detecting fake videos or images that have been generated using deep learning techniques. Deepfakes are created by using machine learning algorithms to manipulate or replace parts of an original video or image, such as the face of a person. The goal of deepfake detection is to identify such manipulations and distinguish them from real videos or images[1].

“With the development of deep learning, video forgery technology is becoming more and more mature, which may bring security risk and the further development of forgery **detection** is urgently needed. Most of the existing forgery **detection** technique are based on artifacts and detail features, which are greatly affected by the resolution, and its generalization ability needs to be improved. In this paper, a multi-modal fusion forgery **detection** model architecture based on the inherent biological signals and spatio-temporal signals in videos is proposed. In the process of forgery **detection**, the model first recognizes the face of the video. Subsequently, video frame extraction and rPPG signal extraction based on Green channel are performed on the video, respectively. These two data are later input into 3D and 2D convolutional neural networks to train the base learner respectively. Finally, the integration model is constructed based on stacking strategy. Sufficient experiments show that the established fusion model can cope well with low-resolution cases and has good generalization performance, achieving 93.38% and 91.57% accuracy on FF++ c23 and celeb-DF-v2 data set, respectively[2].” Celebrities, politicians, and other prominent figures face significant risks from the challenge of detecting deep fakes. Over recent years, extensive research has been conducted to grasp the workings of deep fakes, resulting in the development of numerous deep learning-based algorithms aimed at detecting deep fake videos or images. This study provides a comprehensive assessment of both deep fake creation and detection technologies, leveraging various deep learning algorithms. Moreover, it delves into the limitations of current detection approaches and the accessibility of databases within society. The absence of a precise and automated deep fake detection system poses a considerable threat, given the ease with which these deceptive videos and images can be created and disseminated[3].

We contend that the geographical distribution of colleges significantly influences overall enrollment due to the impact of proximity on students' enrollment decisions, as discussed by Card (2001). Notably, majors like home economics were notably prevalent in land grant colleges, particularly after the 1890 Morrill Act, which established land grant colleges specifically for Black students in most states. Denominational colleges, comprising approximately three-quarters of all colleges, were instrumental in driving the growth of the total number of colleges between 1850 and 1890[4]. The second chapter of the study delves into the dynamics of interwar unemployment in Britain, employing econometric techniques to highlight the influence of structural changes on unemployment rates. It reveals that industries facing structural disadvantages experienced higher unemployment rates, and certain segments of the labor market exhibited more flexibility than others[5]. Various approaches have since been described in the literature to deal with the problems raised by Deepfake[6], [7]. To provide an updated overview of the research works in Deepfake detection, we conduct a systematic literature review (SLR) in this paper, summarizing 112 relevant articles from 2018 to 2020 that presented a variety of methodologies[7].

If you’re a data scientist curious about deep learning but don't know where to start or feel intimidated by the complexities of large neural networks, then this book is for you. Expert data scientists making the transition from other DL frameworks to PyTorch will also find plenty of useful information in this book, as will researchers interested in using PyTorch Lightning as a reference guide[8]. It provides techniques to solve hard language problems and may even help with fake news anxiety (read chapter 13 for more details)[9]. You'll see how cutting-edge platforms, such as OpenAI, have taken transformers beyond language into computer vision tasks and code creation using DALL-E 2, ChatGPT, and GPT-4[4].

REFERENCE

[1] “DeepFake Detection | Papers With Code.” Accessed: Mar. 12, 2024. [Online]. Available: https://paperswithcode.com/task/deepfake-detection

[2] L. Yang, W. Shu, Y. Wang, and Z. Lian, *Integration Model of Deep Forgery Video Detection Based on rPPG and Spatiotemporal Signal: Green, Pervasive, and Cloud Computing : 18th International Conference, GPC 2023, Harbin, China, September 22–24, 2023, Proceedings, Part I*, vol. 14503. in Lecture Notes in Computer Science. 14503, vol. 14503. Singapore: Springer Nature Singapore, 2024, p. 127. doi: 10.1007/978-981-99-9893-7\_9.

[3] A. Mary and A. Edison, “Deep fake Detection using deep learning techniques: A Literature Review: 2023 International Conference on Control, Communication and Computing (ICCC), Control, Communication and Computing (ICCC), 2023 International Conference on,” *2023 International Conference on Control, Communication and Computing (ICCC), Control, Communication and Computing (ICCC), 2023 International Conference on*, pp. 1–6, May 2023, doi: 10.1109/ICCC57789.2023.10164881.

[4] Denis Rothman and Antonio Gulli, *Transformers for Natural Language Processing : Build, train, and fine-tune deep neural network architectures for NLP with Python, Hugging Face, and OpenAI’s GPT-3, ChatGPT, and GPT-4*. Packt Publishing, 2022.

[5] “Summaries of Doctoral Dissertations: Journal of Economic History,” 2022. doi: 10.1017/S0022050722000195.

[6] Raveena, P. Punyani, and R. Chhikara, “Comparison of Different Machine Learning Algorithms for Deep Fake Detection: 2023 International Conference on Communication, Security and Artificial Intelligence (ICCSAI), Communication, Security and Artificial Intelligence (ICCSAI), 2023 International Conference on,” *2023 International Conference on Communication, Security and Artificial Intelligence (ICCSAI), Communication, Security and Artificial Intelligence (ICCSAI), 2023 International Conference on*, pp. 58–63, Nov. 2023, doi: 10.1109/ICCSAI59793.2023.10421164.

[7] M. S. Rana, M. N. Nobi, B. Murali, and A. H. Sung, “Deepfake Detection: A Systematic Literature Review,” *IEEE Access*, vol. 10, pp. 25494–25513, 2022.

[8] Kunal Sawarkar, *Deep Learning with PyTorch Lightning : Swiftly build high-performance Artificial Intelligence (AI) models using Python*. Packt Publishing, 2022.

[9] M. Rostami, A. Farajollahi, and H. Parvin, “Deep learning-based face detection and recognition on drones: Journal of Ambient Intelligence and Humanized Computing,” *Journal of Ambient Intelligence and Humanized Computing*, vol. 15, no. 1, pp. 373–387, Jan. 2024, doi: 10.1007/s12652-022-03897-8.