­­­ For my assignment, I explored solutions to the Deepfake Detection Challenge on Kaggle. The purpose of this challenge is for researchers to find innovative new ways to identify deepfakes and altered media. Participants are given sets of videos, with the corresponding labels “real” or “fake,” signifying if the video is a deepfake or not. While I was tasked to find a solution that utilized Generative Adversarial Networks (GANs), I could not find a submitted solution with available code that used one. However, while looking through the various submissions, I noticed some common themes, and some stand-alone solutions, which I will summarize.

One solution that I found utilized image noise pattern recognition. First, for all frames in a video, the frames would be face cropped (by MTCNN or other means) and standardized. Next, a Gaussian Blur would be applied to the frames. The original frame and the blurred frame would be compared and the difference between them is known as noise. These noise matrices would be used as a set of features and would be matched to its corresponding label. In this solution, there were many more fake videos than real, so the real videos were up-sampled. The features were then fed into a custom-built 3D-CNN and GRU. This is just one solution that I found interesting, given its simplicity.

Outside of the first example, there was not much variety in solutions. Most participants utilized ensemble methods using ResNet, ResNext, Xception, and MobileNet. These seemed to be the most popular models out of the entries. However, they did share a same step as in the first example, face extraction. Face extraction seems to be a necessary first step in identifying deepfakes.

Image Noise Pattern (Want to focus on this one to recreate): <https://www.kaggle.com/jianingsunjs4770/deepfake-based-on-image-noise-pattern>

ResNext & Xception Ensemble: <https://www.kaggle.com/revanthrex/xception-resnext-ensemble-for-deepfake-0-45>

<https://www.kaggle.com/timesler/face-sequence-ensemble-inference>