Module 6

GAN is a powerful tool as it can potentially mirror any data distribution based on unsupervised learning. It can generate content in various mediums with unheard-of similarity – images, audio, and video.

GANs captured the media's attention with its eerily realistic deep fakes of celebrities. Seemingly out of nowhere, the internet was swept by videos of Steve Buscemi's face molded into Jennifer Lawrence's and movie clips with Nicolas Cage's being inserted into them. While this technology can indeed embed other people's faces/voices into pre-existing content, we shouldn't treat this technology lightly and narrow it down to memes and gags.

The possibility of imitating human voice has already been used with malicious intent. The cases vary from defrauding people to substituting people's faces in videos with explicit content. Major tech and research companies are hunting for solutions to this problem and hold competitions to find one. Some government bodies are already contemplating to introduce regulations impelling people to tag deepfake content.

Producing deep fakes is only one aspect of a tidal shift that the technology entails. As the next step in GAN's developments, we can expect applications aimed at not only generating content but stand-alone tools to identify deep fakes. We are conducting research and tests in both directions. Since there are always risks of criminals taking advantage of deep fakes, solutions to accurately pinpoint them will provide a decent level of protection. Also, as mentioned before, the output material can be marked as such to distinguish it from real content.

We realize that this technology has the potential to be misused, and we make efforts to address these issues. The goal is to ensure its legal and useful operation. From the technical point of view, the GAN technology can make some pretty amazing accomplishments. People can enjoy new music from musicians that are no longer alive or see new artwork by artists from centuries ago. Overall, it can have a myriad of valuable and entertaining applications.

MRI-GAN generates MRI of the input image. The MRI is DeepFake image contains artifacts which highlights regions of synthesisezed pixels. The MRI of non-DeepFake image is just black image.

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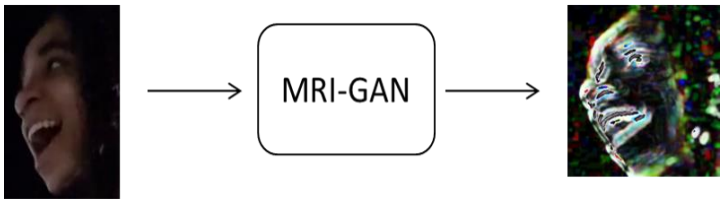
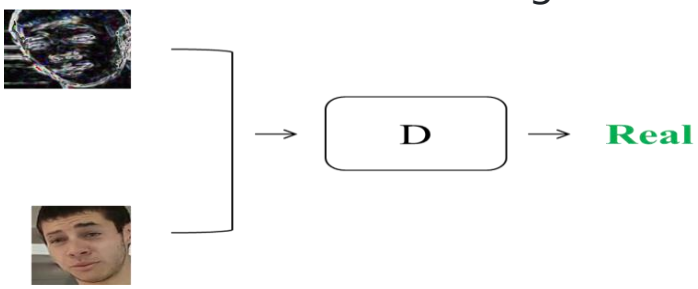
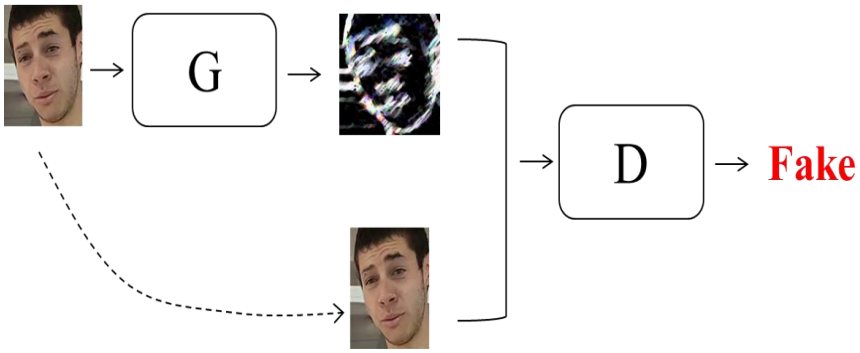


MRI-GAN adversarial training





MRI-GAN training data formulation

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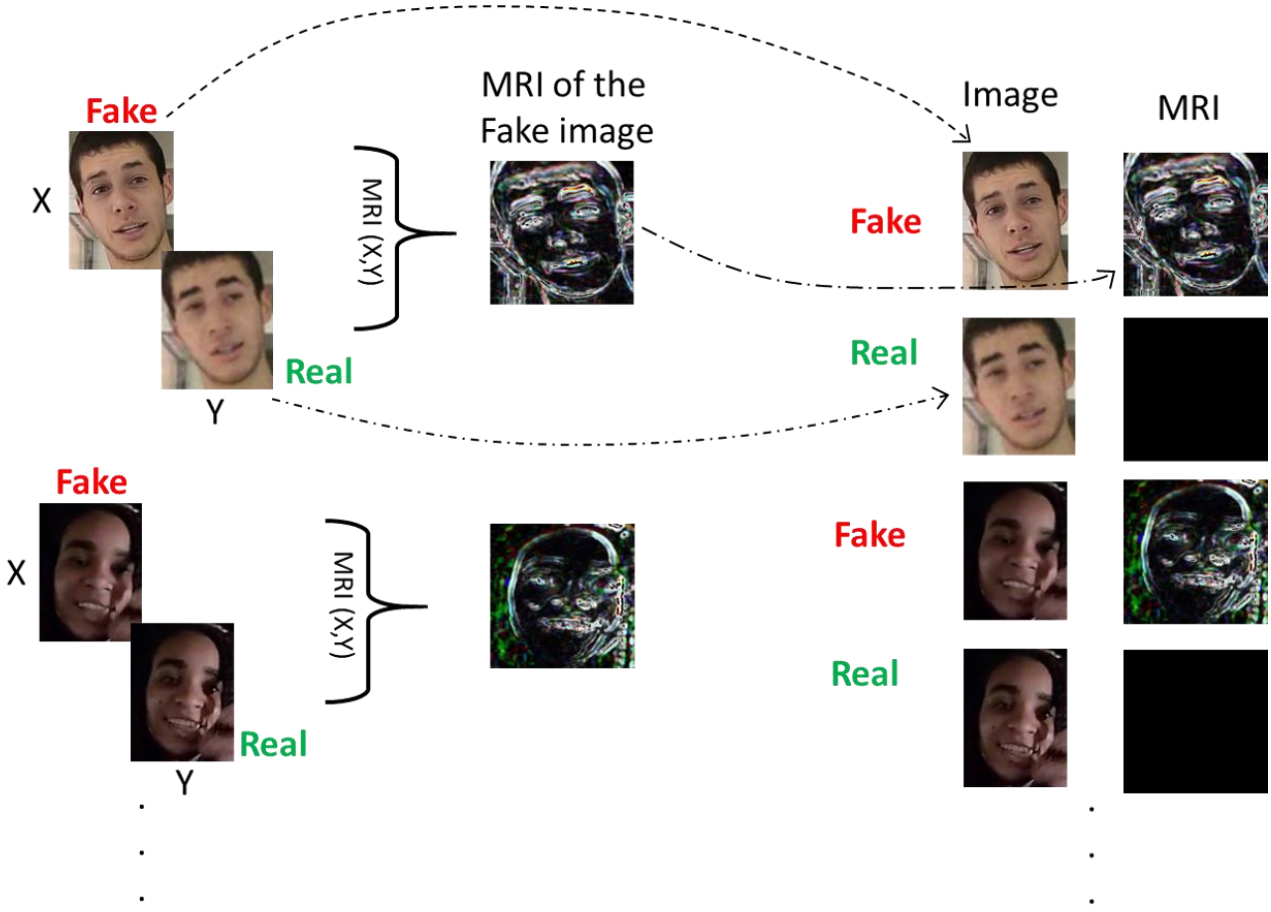
Fake
X
Y
Real
MRI (X,Y)
MRI of the
Fake image
Image
MRI
Fake
Real
Fake
X
Y
Real
MRI (X,Y)
Fake
Real