# Study of Generative Adversarial Networks
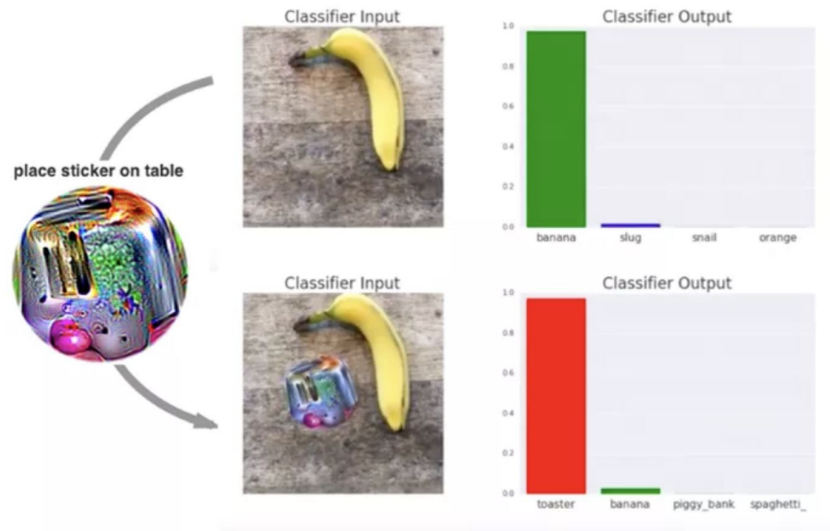
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For our final project, we want to continue our study of neural networks in CS999 and specifically focus on learning about Generative Adversarial Networks(GAN). GANs are a class of unsupervised machine learning algorithm. It's implemented by two neural networks, the GAN and the discriminator network contesting with each other in a zero-sum game framework. One of the main uses of GANs is generating photographs that are superficial to human viewers but hold realistic characteristics to image recognizing softwares.

We believe learning about GANs will gain us tremendous insight to neural nets, (specifically those dealing with image recognition), pytorch vs tensorflow, semi-supervised learning algorithms, deep learning, how to implement multiple competing neural nets.
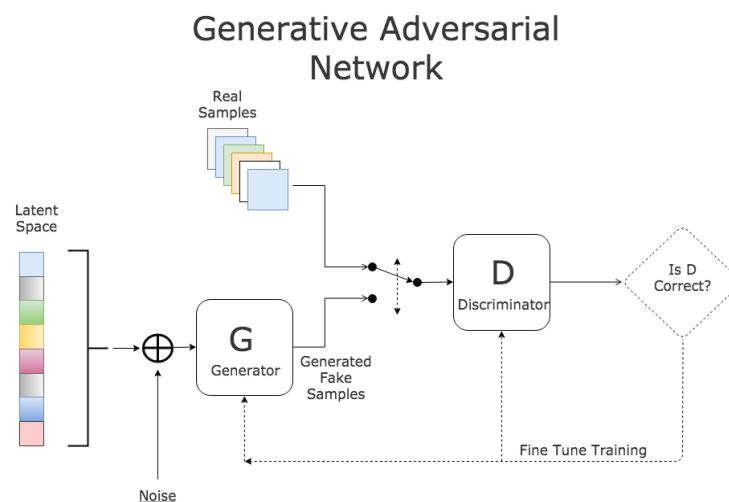
Furthermore, recently Google researchers have developed psychedelic sticker that, when put onto any image, will trick the neural network into thinking it's a toaster - something apparently false to human viewers. This since then has started a heated debate to the security of image recognition software. For example, how should image recognition software inside a self-driving car deal with possible interference from GANs? We believe learning more about this new field will give us insight into this new problem posed to the world of high tech.

https://gizmodo.com/this-simple-sticker-can-trick-neural-networks-into-thin-1821735479

Here's the implementation guide which we will learn from and follow:
https://papers.nips.cc/paper/5423-generative-adversarial-nets.pdf,
https://blog.openai.com/generative-models/#gan,
https://medium.freecodecamp.org/an-intuitive-introduction-to-generative-adversarial-networks-gans-7a2264a81394

Project Timeline:

5/10	Studying background information, history and relevant news about GAN algorithm.
5/11 - 5/13	Understanding the concept of GAN intuitively (Math, how is it different from a normal neural net, what is a zero sum game framework, why does it need multiple neural nets, etc.)
5/14 - 5/18	Implementing our own GAN algorithm.
5/18-5/22	Testing, and further develop this project and attempt to train our GAN algorithm to produce similar "toaster stickers".

Work Distribution

Throughout the project, we will study the materials together and make sure both have the same intuitive understanding of GAN algorithm, however, when it comes to implementation and putting together the presentation, the workload is as follows:

Penny: Writing project proposal, studying the theoretical and math associated with GAN, constructing the final presentation.

Thomas: implementing the general GAN algorithm, training and testing, constructing the final presentation.

Viewing our Program:

Click on the link above, which will send you to a detailed description of our project and theoretical understanding of GAN algorithm. A detailed instruction on how to install our code is given on slide 24.

https://docs.google.com/presentation/d/1c-HPqwCLtIW_RXWWw1VJJU0yeHTWjhOXId KqpNyUeqM/edit