Cluster 6 Week 1

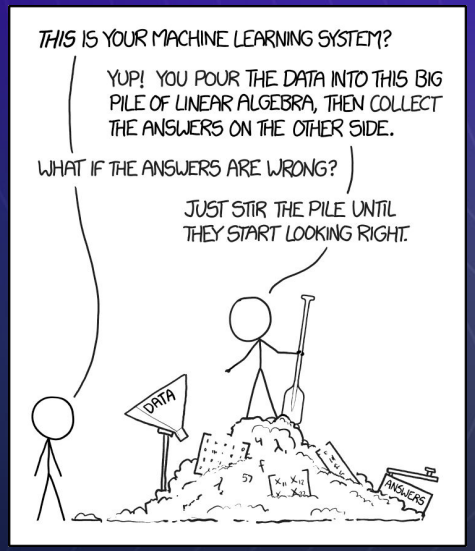
Team Modulation:
Alex, Ian, Leonard, Rohan

Modulation: encoding information to be transmitted (e.g. on radio)

Reflection

Monday

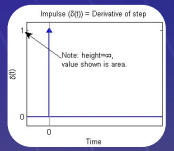
Common perceptions of signals (WiFi, etc.)
Heard the name of Fourier Transforms
Heard of convolution
Seen Euler's formula
Roughly knew what AI is



Friday

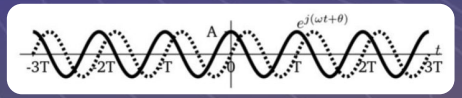
Signals and Systems

Impulse Function



Complex Sinusoids

$$Ae^{j(\omega t+\phi)} = A(\cos(\omega t+\phi) + j\sin(\omega t+\phi))$$



Convolution

$$(f * g)(t) = \int_{-\infty}^{\infty} f(\tau)g(t-\tau)\,d\tau$$

Fourier Transforms

$$F(j\omega) = \int_{-\infty}^{\infty} f(t)e^{-j\omega t}\,dt$$

Application Of CNN

Open AI Sora, the most powerful video generation AI.

Sora uses a convolutional diffusion based neural network to generate realistic videos based on prompts from the user

CNN and Diffusion

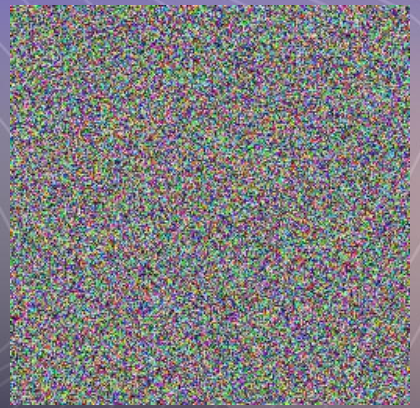
CNN stands for convolutional neural network. This uses the idea of convolution which takes a portion of an image, called a kernel, and performs an operation on it.

Sora works through diffusion which means that it begins with noise in the shape of the desired video and then it uses convolution to morph it into the final video.

10	20	30	40
10	20	30	40
20	30	40	50
20	30	40	50

0	-1	0
-1	5	-1
0	-1	0

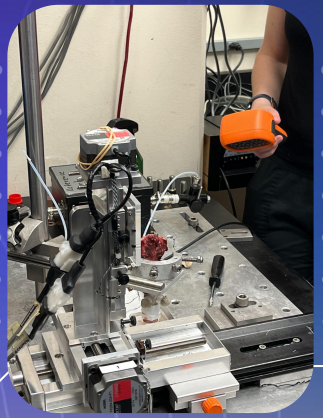
10	20
40	50



Interactives

Field Trip

- Sound produced by air that vibrates the larynx
- Insight into speech and listening development research



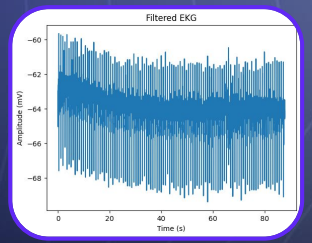
Noisy image

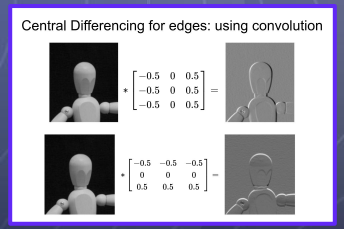
Noiseless image

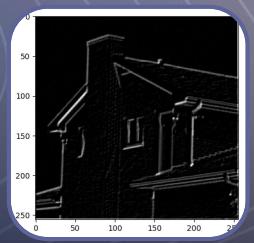
Average filter

Gaussian filter

Median filter







Notebook

- Processed images using convolution and filters
- Fourier transform can identify frequencies

3 Truths and a Lie

Leonard

Has a considerable amount of Yu-Gi-Oh! cards

L

I

Ian

Has a New Jeans photocard in phone case

Alex

Likes beans on toast

A

R

Rohan

Is a fan of the Dallas Mavericks