

DEEP INTO CNN

MID-EVAL REPORT

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AIM OF THE PROJECT

- Introduce different types of Neural networks.
 - MLP
 - CNN
- Why do we need different Networks?:
 - Solution Architecture
 - Effectiveness of Proposed Network , Performance Comparison



WEEK-1



WEEK-2



WEEK-3



WEEK-4

HACKATHON-1
STARTS

HACKATHON-1 ENDS

PAPER-1
IMPLEMENTATION
STARTS

ROADMAP & TASKS ASSIGNED

<https://github.com/mabhay3420/Deep-Into-CNN>

Week 1 Goals

Numerical data : Multi layer Perceptron (MLP) :

- Regression : Week 1 : : Python Implementation
 - Gradient Descent,relu layer, MSE loss
 - Binary Classification,sigmoid layer,BCE loss
 - Multiclass Classification,softmax layer

WEEK 1 TASKS

1. Content reading on Regression And Shallow NN Using Python.
 - Things Learnt:
 - Cost/Loss function
 - (Stochastic) Gradient descent
 - Python Implementation from scratch

2. Completing the programming exercises shared and updating github repo with practice code and completed exercises.
 - Things learnt:
 - Basic data handling with numpy and pandas
 - Implementing sigmoid and error calculation functions
 - Training and implementing shallow NN from scratch in python

WEEK 2 Goals

- NLL loss MLP + PyTorch :
 - Linear Algebra, Single Layer NN, Training, - Inference and Validation : Illustrated Through Pytorch
 - Implement 1-hidden layer NN using PyTorch but train in python

WEEK 2 TASKS

- Content reading on Neural Networks
 - Backprop
 - Softmax, etc
- Update github repo with both practice code you write and completed programming exercises shared : W 2 Folder,Clean,Minimal Code
- Hackathon 1 starts

Week 3 Goals

Intro to CNN :

- Simple Feed-forward Network :
 - Flatten image first and then treat as numerical data
- Convolutional Neural Networks :
 - Use Spatial Information
- Compare results with MLP on MNIST data
- LeNet : Week 3
 - Convolution + [Pooling] + Fully connected layers

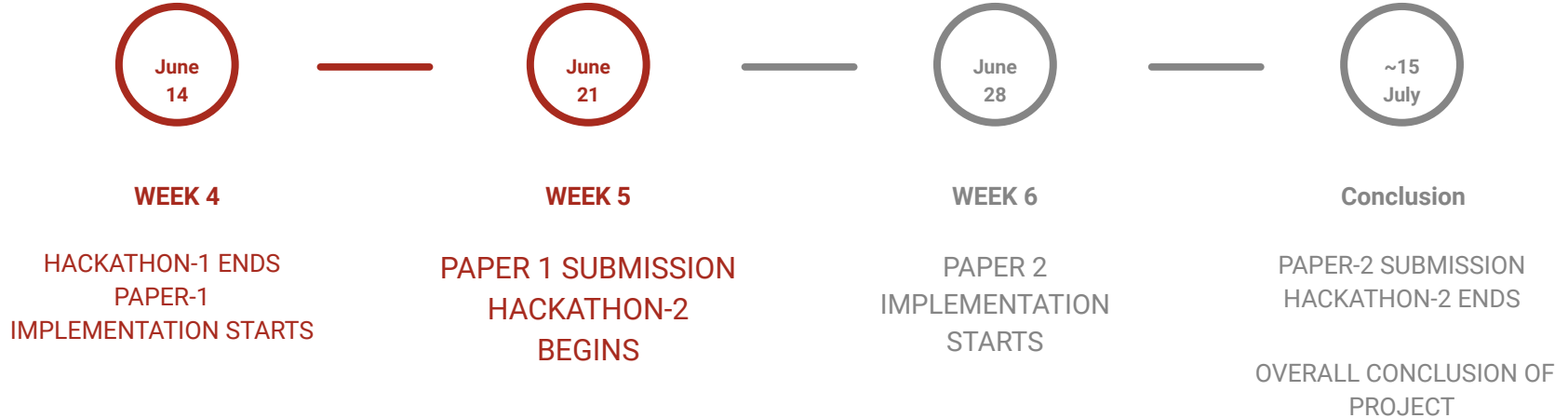
WEEK 3 TASKS

- Hackathon 1 submission
- Notebook assignments on CNNs
- Gain familiarity with SOTA models on ImageNET classification paper, AlexNet, VGG, Inception, Xception

HACKATHON -1 DETAILS

- Conducted on Kaggle
- Contest name - **Tabular Playground Series - Jun 2021**
- Two submissions per mentee:
 - A simple regression model
 - NN using pytorch
- <https://www.kaggle.com/c/tabular-playground-series-jun-2021>

TENTATIVE TIMELINE TILL COMPLETION



ROADMAP AHEAD

WEEK 4-5

Optimization of Neural Nets :

- Optimizer variation :
 - SGD with Momentum, Nesterov and Adam
- Overfitting and Regularization
 - L1, L2
 - Batch-Norm
- Hyperparameter tuning
 - Variable learning rate,
 - Weight Initialization : Xavier, He Normal

WEEK 5-6

Advanced Topics :

- Autoencoders (Optional for Y20)
 - Convert High dimension to Low dimension data
 - Should be able to convert Low to high with minimum error
 - MLP :
 - First flatten images i.e. convert to numerical data
 - As a (ineffective) compression method
 - Convolution :
 - For Denoising images
 - Uses Transposed Convolutions

WEEK 6

Advanced Topics :

- Generative Adversarial networks : (Optional for Y20)
 - Generate new data points as efficiently possible
 - Generator : Generate fake data
 - Discriminator : Recognize fake data and penalize Generator
 - Generator and Discriminator Compete with Each Other !!

THANK YOU