PHASE 2 FOR AI SECOND YEARS:

The task phase for 2nd phase applicants will go on for approximately 3 months(considering all in-sem exams). This task phase aims to help the applicants build a strong base in Machine learning, Deep Learning – Neural Nets, CNNs, RNNs and GANs, allowing them to explore their field of interest in the future.

Mentors will hold interviews each week in order to test the depth of understanding of both concepts and code. Candidates must understand the code of each topic either through the programming assignments/own resources. They must create a GitHub repo documenting the topics and implementations.

Note: You are not restricted to these resources; feel free to use any other material you come across!

Week 1:

Machine Learning: Week 1 to Week 5
Pre-requisites: Python basics

- Supervised Learning and Unsupervised Learning
- Linear Algebra
- Linear Regression(Cost Function, Batch Gradient Descent)
- Regression Analysis and Gradient Descent
- Multivariate Linear Regression
- Polynomial Regression
- Logistic Regression
- Regularization
- Basics of Neural Networks

Week 2:

Linear regression implementation: Implement a linear regression module from scratch for the housing prices dataset.

Logistic regression implementation: Implement a logistics regression module from scratch for the titanic dataset.

Week 3:

Machine Learning: Week 6 to Week 11

- Model Selection -Bias and Variance
- Precision and Recall
- Support Vector Machines
- Clustering (Kmeans, Elbow Method)
- Dimensionality Reduction (PCA)
- Decision Tree Algorithm
- Random Forest

Week 4:

Deeplearning.ai: Course 1 and Course 2

- Activation Functions
- Vectorization
- Gradients
- Deep L-layer Neural Networks
- Forward and Backward Propagation
- Batch Normalization, Gradient Checking
- Stochastic and Mini Batch Gradient descent, Momentum, RMSProp, ADAM Optimizer
- Early Stopping
- Vanishing and Exploding gradients
- Exponentially Weighted Averages

Week 5:

Deeplearning.ai: Course 3

- Orthogonalization
- Single Number Evaluation Metric, Satisfying and Optimizing Metric
- Train/test/dev (validation) set distributions
- Bias and Variance
- Transfer Learning

Neural Network implementation: Implement a Neural net from scratch for the MNIST dataset.

Week 6:

Deeplearning.ai: Course 4

- All basics of CNN
- Data Augmentation
- Object Detection

- Localization, Sliding Windows, Bounding Boxes
- IOU, Non-max Suppression, Anchor Boxes
- YOLO
- Alexnet, VGG Object Detection
- LeNet-5, ResNet, Inception (GoogleNet)

Week 7:

Deeplearning.ai: Course 5

- RNNs
- GRUs
- LSTMs
- Word Embeddings
- Word2vec
- Glove Word Vectors
- Beam search
- Attention models

Week 8:

Implement either a CNN or RNN based project using a framework of your choice (Pytorch/Tensorflow).