**AI6 COHORT 5 – DEEP LEARNING**

COURSE OUTLINE­

**Week 1**

1. Introduction to Deep Learning and its applications (Slide).
2. Matrix mathematics and NumPy refresher (udacity and deeplearningwizard)

**Week 2**

1. Introduction to Deep Learning with Pytorch (udacity and deeplearningwizard) (Slide).
2. Matrices in Pytorch, and conversion from NumPy to Torch tensor and tensors in gpu and cpu (udacity and deeplearningwizard).
3. Gradients in Pytorch (udacity and deeplearningwizard).
4. Linear Regression and Logistic Regression using Pytorch (deeplearningwizard).
5. Perceptron Algorithm.

**Week 3**

1. Introduction to Neural Networks (Udacity) (Slide).
2. Feed Forward Theory (Making your NN)
3. Feed Forward Practical (deeplearningwizard).

**Week 4**

1. Back Prop Theory (Making your NN)
2. Back Prop Practical (deeplearningwizard).
3. Combining FF and BP in Pytorch from scratch

**Week 5**

1. Combining FF and BP in Pytorch
2. Training NN algorithms

**Week 6**

1. Sentiment Analysis
2. Project Bike Sharing Patterns

**Week 7**

1. Introduction to CNN (Slide).
2. How CNN works (Slide).
3. Building CNN on paper (Slide).

**Week 8**

1. Building a CNN using Pytorch.
2. Transfer Learning
3. Projects and Competition Participation

**Week 9**

1. Style Transfer
2. Autoencoders

**Week 10**

1. Learning Rate Scheduling
2. Optimization Algorithm
3. Weight Initialization and Activation Functions
4. Projects and Competition Participation

**Week 11**

1. Introduction to RNN (Slide).
2. LSTMs (Slide).
3. Implementation of RNN & LSTM
4. Hyperparameters
5. Embeddings & Word2Vec

**Week 12**

1. Sentiment Prediction using RNNs
2. Generate TV Scripts and Lyrics using RNNs
3. Attention (Slide).
4. Time Series Prediction

**Week 13**

1. Intro to GANs (Slide).
2. DCGANs
3. Pix2Pix & CycleGAN
4. Implementing a CycleGAN
5. Generate Faces
6. Assignment – StyleGANs

**FINAL PROJECT**

1. Use GANs to generate faces based on voices.

Which of these types of NNs works better with images?

What is the essence of “Convolution” in CNNs?

What is the difference between Tensors and Matrices/Vectors?

Which of these types of NNs works better with time series data?

What is the difference btw DL and ML?

Which of these diagrams represents a NN (should include bias)?

Which of these statements best describes what “Hyperparameters” mean?

What happens in the “dropout layer”?

What is transfer learning?

What is the difference between image recognition and image classification?