Course Code: BTCS621-18	Course Title: Mobile Application Development Lab	L:0; T:0; P:2	1Credits

LIST OF PRACTICALS

1. Introduction to Android platform. Introduction to the tools used in the lab. Create a simple application
2. Understand the app idea and design user interface/wireframes of mobile app
3. Set up mobile app development environment
4. Write a program using activity class to show different events.
5. Write a program to convert text to speech.
6. Develop and debug mobile app components – User interface, services, notifications, broadcast receivers, data components
7. Using emulator to deploy and run mobile apps
8. Testing mobile app- unit testing, black box testing and test automation

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Course Code: BTCS 704-18	Course Title : Deep Learning	3L:0T:0P	3Credits

Detailed Contents:

UNIT 1: **Machine Learning Basics:** Learning, Under-fitting, Overfitting, Estimators, Bias, Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning, Unsupervised Learning and Stochastic Gradient Decent.

[4hrs] (CO 1)

UNIT 2: Deep Feedforward Network: Feed-forward Networks, Gradient-based Learning, Hidden Units, Architecture Design, Computational Graphs, Back-Propagation, Regularization, Parameter Penalties, Data Augmentation, Multi-task Learning, Bagging, Dropout and Adversarial Training and Optimization.

[4hrs] (CO 2)

UNIT 3: Convolution Networks: Convolution Operation, Pooling, Basic Convolution Function, Convolution Algorithm, Unsupervised Features and Neuroscientific for convolution Network.

[6hrs] (CO 3)

UNIT 4: Sequence Modelling: Recurrent Neural Networks (RNNs), Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Network, Recursive Neural Networks and Echo State networks.

[12hrs] (CO 4)

UNIT 5: Deep Generative Models: Boltzmann Machines, Restricted Boltzmann Machines, Deep Belief Networks, Deep Boltzmann Machines, Sigmoid Belief Networks, Directed Generative Net, Drawing Samples from Auto –encoders.

[14hrs] (CO 5)

Course Outcomes:
After undergoing this course, the students will be able to:
CO1: Comprehend the advancements in learning techniques
CO2: Compare and explain various deep learning architectures and algorithms.
CO3: Demonstrate the applications of Convolution Networks
CO4: Apply Recurrent Network for Sequence Modelling
CO5: Deploy the Deep Generative Models

Suggested Readings/ Books:

Text Books:

1. *Goodfellow L., Bengio Y. and Courville A., Deep Learning, MIT Press (2016).*
2. *Patterson J. and Gibson A., Deep Learning: A Practitioner's Approach, O'Reilly (2017), 1st ed.*

Reference Books:

1. *Haykin S., Neural Network and Machine Learning, Prentice Hall Pearson (2009), 3rd ed.*
2. *Geron A., Hands-on Machine Learning with Sci-kit and TensorFlow, O'Reilly Media (2017)*

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Course Code: BTCS 705-18	**Course Title: Deep Learning Lab**	**L:0;T:0; 2P:**	**Credits;1**

Detailed List of Tasks:

- Creating a basic network and analyze its performance
- Deploy the Confusion matrix and simulate for Overfitting
- Visualizing a neural network
- Demo: Object Detection with pre-trained RetinaNet with Keras
- Neural Recommender Systems with Explicit Feedback
- Backpropagation in Neural Networks using Numpy
- Neural Recommender Systems with Implicit Feedback and the Triplet Loss
- Fully Convolutional Neural Networks
- ConvNets for Classification and Localization
- Text Classification and Word Vectors
- Character Level Language Model (GPU required)

Suggested Tools Python/R/MATLAB
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