Birla Institute of Technology and Science, K.K. Birla Goa Campus
Center for Technical Education
Second Semester – 2021-2022

Course Title: Intro To ML and DL

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Course Description:

Machine Learning is a field that is developing at a tremendous pace today. It becomes all the more important that today's engineers are aware of the nitty-gritty of Machine Learning. This course aims to provide the students with an in-depth knowledge of Machine Learning, including theoretical and practical aspects. The course will also focus on making sure students are accustomed to learning new concepts independently through research papers, MOOCs, and others' understanding of people's code. As the field has become much more diverse than before, this course will also discuss basic concepts of recent Deep Learning and Reinforcement Learning methods, which will help the students pursue their journey into these fields further.

Course Prerequisites:

None

Course Plan:

Week	Topic	Subtopic
1	What is ML, DL, AI, RL? Intro to Python	**Python**: Lists, Tuples, Dictionaries, Conditionals, Loops, Iterators, Functions, Comprehensions - Using **Jupyter** notebooks, Google Colab and GitHub
2	-Linear and Logistic Regression -Exploratory Data Analysis (how to clean data, find correlations in data) -Feature engineering (Handling missing values, bad data).	- Pandas - Matplotlib - Box plots, correlation plots - Introduction to scikit-learn

3	- KNN, SVM, Naive Bayes Classifier.
	- Decision tree, GBM, and Random forests. Math and statistics behind it.
		● Bias-Variance Trade-off,
		● Validation techniques
		  Metric selection
		● Loss selection and
		  Info theory
		● Bagging and Boosting

4	-Intro to OOP for ML -Neural nets -PyTorch Computation graphs	● Activation functions ● Backpropagation ● PyTorch Hooks
5	- Convolutional Neural Networks - Transfer Learning	● Working of CNN ● Augmentation techniques ● Tricks while training a CNN model.
6	- RNN - Intro to NLP - How to feed text data to machines?	● Frequency vectors ● Word-embeddings ● contextual Embedding
7	-Intro to Reinforcement learning -State-Action concept -Value and Policy-based methods -Q Tables	● Intro to Open-AI gym ● Frozen Lake
8	Reading Research Papers	● Reading some research papers and class discussion

End Project Description: Final projects will require students to learn some new concepts independently and thus align with this course's goal.

Evaluation Components:

1. Kaggle Competitions/tutorial assignments.
2. Final Project

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