Lok Jagruti Kendra University
University with a Difference

Diploma in Gaming & Animation

Course Code: 025110608

Machine Learning

Programme / Branch Name			Diploma in Gaming & Animation			
Course Name	Machine Learning				**Course Code**	025110608
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	4	5	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Programming, Data Structure, Algorithms,
- ✓ Basic knowledge of Probability, Statistics and Mathematics.

3. Rationale

The objective of the course is to introduce the students with concepts of Machine Learning, Machine Learning algorithms and building the applications using machine leaning for various domains.

4. Objectives

- ✓ The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.
  - Understand the concept of learning patterns from data.
  - Develop a strong theoretical foundation for state-of-the-art Machine Learning algorithms.
  - To enable students to identify, formulate and solve Machine Learning problems.

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcomes	% Weightage	Hours
1	**Introduction to Machine Learning**	1.1. Overview of Human Learning and Machine Learning 1.2. Difference of Artificial Intelligence and Machine Learning 1.3. Types of Machine Learning: Supervised, Unsupervised and Reinforcement Learning 1.4. Applications of Machine Learning	• Understand Machine Learning and its applications • Understand the types of Machine Learning algorithms.	10	3
2	**Preparing the Model, Modelling and Evaluation**	2.1. Selecting a Model: Predictive/Descriptive 2.2. Training a Model for Supervised Learning 2.3. Model Representation and Interpretability 2.4. Evaluating Performance of a Model 2.5. Improving Performance of a Model. 2.6. Bias–variance tradeoff 2.7. Cross-validation techniques	• An understanding of how to select a predictive or descriptive model • An understanding of how to train a model for supervised learning • An understanding of how to represent and interpret a model • An understanding of how to improve the performance of a model.	15	6
3	**Probability and Statistics**	3.1. Overview of Probability 3.2. Statistical Tools in Machine Learning 3.3. Concepts of Probability 3.4. Random Variables 3.5. Discrete Distributions 3.6. Continuous Distributions 3.7. Multiple Random	• An overview of probability and its statistical tools in Machine Learning. • To learn about various Distributions • To learn about continuous and random variables sampling distributions • Hypothesis Testing and Monte Carlo Approximation.	25	9

		Variables 3.8. Central Limit Theorem 3.9. Sampling Distributions 3.10. Hypothesis Testing and Monte Carlo Approximation			
4	**Classification & Regression Algorithms**	4.1. Classification 4.2. Types of Classification 4.3. Regression 4.4. Types of Regression 4.5. Supervised Machine Learning Algorithms: Linear Regression, Support Vector Machines, Decision Trees, Random Forest, Logistic Regression, KNN, Naïve Bayes.	• An understanding of classification and regression algorithms and how to apply them	30	14
5	**Clustering and Association Rules**	5.1. Clustering: K-Means, Hierarchical 5.2. Association Rules: Apriority	• To gain knowledge of clustering algorithms and association rules and how to apply them	20	10
				Total Hours	**42**

6. List of Practicals / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No.	Practical / Exercises	Key Competency	Hours
1	Implement operations on data with statistical functions • Mean (all types of Mean) • Median • Mode • Random variable • Standard Deviation • Variance • Co-variance	To improve skills to identify patterns in the data using statistical functions through data processing.	4
2	Implement operations on data with statistical functions • Co-relation • Z-score • F1-Score • Accuracy-Score	To improve skills to identify patterns in the data using statistical functions through data processing.	4

	• Confusion Matrix • R2-Score		
3	Choose any one dataset from Kaggle and implement Exploratory Data Analysis and Apply Feature Engineering • Missing values • Numerical variables • Distribution of the numerical variables • Categorical variables • Outliers • Relationship between independent and dependent features • Handling missing values • Handling temporal variables • Handling categorical variables: remove rare labels • Drop categorical values • Label Encoding • On-Hot Encoding	To learn about the Exploratory Data Analysis which is used to learn the data before making any assumptions.	4
4	Implement Predictive Modeling Classification on Given data and Apply given algorithm and find accuracy, classification report and F1 score. • Binary Classification • Multi-Class Classification	To learn about how to solve Supervised Machine Learning problem for classifying the data and find accuracy and classification report.	4
5	Implement Predictive Modeling Classification on Given data and Apply given algorithm and find accuracy, classification report and F1 score. • Multi-Label Classification • Imbalanced Classification	To learn about how to solve Supervised Machine Learning problem for classifying the data using Multi-Label, Imbalanced and find accuracy and classification report.	4
6	Implement Support Vector Machine classification algorithm and find accuracy, classification report and F1 score.	To learn about how to solve Supervised Machine Learning problem for classifying the data using SVM and find accuracy and confusion matrix.	4
7	Implement Decision Trees algorithm and find accuracy, Confusion Matrix and F1 score.	To learn about how to solve Supervised Machine Learning problem for classifying the data using Decision tree and find accuracy and confusion matrix.	8
8	Implement supervised algorithm and apply the best fit line on the data using Linear Regression.	To learn about how to solve Supervised Machine Learning problem for Linear regression line fitting on the data.	8

9	Implement Supervised algorithm and apply the best fit line on the data using Logistic Regression.	To learn about how to solve Supervised Machine Learning problem for Logistic regression line fitting on the data.	8
10	Implement data clustering algorithm.	To learn about how to solve Unsupervised Machine Learning problem for data clustering.	8
		Total Hours	**56**

7. Suggested Specification Table with Hours

Unit No.	Chapter Name	Teaching Hours	Distribution of Topics According to Bloom's Taxonomy					
			R %	U %	App %	C %	E %	An %
1	Introduction to Machine Learning	3	40	30	30	-	-	-
2	Preparing the Model, Modelling and Evaluation	6	20	20	20	-	20	20
3	Probability and Statistics	9	20	30	30	-	10	10
4	Classification & Regression Algorithms	14	20	20	20	10	15	15
5	Clustering and Association Rules	10	20	20	20	15	5	20

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbooks

1) Machine Learning, Saikat Dull, S. Chjandramouli, Das, Pearson

9. Reference Books

1) Machine Learning with Python for Everyone, Mark Fenner, Pearson
2) Machine Learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley
3) Machine Learning with Python, U Dinesh Kumar Manaranjan Pradhan, Wiley
4) Python Machine Learning, Sebastian Raschka, Vahid Mirjalili, Packt Publishing

10. Open Sources (Website, Video, Movie)

1) https://www.geeksforgeeks.org/machine-learning/
2) https://www.tutorialspoint.com/machine_learning_with_python/index.htm