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HANSRAJ COLLEGE
UNIVERSITY OF DELHI
Mahatma Hansraj Marg
Malkaganj, Delhi – 110007
Tel.: 011-27667458, 27667747
E-mail: principal_hrc@yahoo.com
Website: www.hansrajcollege.ac.in

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2023–2024

IQAC centre : Student Learning Centre, Hansraj College

Centre Coordinator: Dr. Pooja Arora

Name of the course: Machine Learning

Course Convener: Prof. (Dr.) Baljeet Kaur

Resource Person: Dr. Baljeet Kaur

Student Coordinators: Nikhil and Divyanshu (B.Sc. Physical Science)

Start Date: 6 October 2023

End Date: 24 November 2023

Duration: 32 Hours

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Summary of the Course

About the Course

In order to empower students with machine learning techniques, an add-on course was conducted on "Machine Learning" for eight weeks starting from 6th October 2023 to 24th November 2023 organized by Hansraj College, University of Delhi. The inaugural session for the course was held on 6th October 2023.

The course was conducted successfully within the mentioned duration.

About the Participations

Total 21 participants from Hansraj college as well as from other institutes such as Shivaji College registered for the course.

About the Modules

During the course, The following modules were covered.

Date	Modules
06th October 2023	Introduction to supervised and unsupervised learning Classification Regression Clustering
07th October 2023	KNN Concept and implementation k, p, distance, accuracy, CM, balanced unbalanced data
14th October 2023	KNN Implementation feature scaling; Train test; shuffle, stratify, crossval; grid search

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18th October 2023	Classification Performance metrics KNN regression and mean square error and doubt solving
19th October 2023	Single perceptron Perceptron learning Rule And OR NOR NOR NAND XOR with some values Gradient descent and delta rule Example of learning w for AND

20th November 2023	Stochastic Gradient Descent Sigmoid Activation Function MultiLayer Perceptron Feed Forward and Back Propagation
28th November 2023	OVERFITTING AND UNDERFITTING Hyperparameter tuning Code NN Save model
28th November 2023	Practical session

31st November 2023	Issues in NN Hidden Layers Weight Initialization AF Sigmoid Tanh Relu Leaky Relu Optimization functions SGD Batch AdaGrad ADAM

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3rd November 2023	Pre-processing: Handling null values, outliers, scaling and standardizing normalizing handling categorical data
4st November 2023	Feature selection: Pearson correlation Select K best Forward feature selection
10th November 2023	Regression and simple linear regression
11th November 2023	Multivariate regression and Polynomial Regression
15th November 2023	Unsupervised Learning Clustering k-means
17th November 2023	Hierarchical Clustering
24th November 2023	Project Presentation

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Attendance Maintenance and Sharing of practice sheets

During the course, the attendance records were maintained on a regular basis. The practice sheets/notebooks along with practice assignments were shared with the participants via a google classroom .

Assessment Strategy

Among 21 registered participants, 15 participants could successfully complete the course. They were selected as eligible for a certificate as they successfully attended 80% or more classes along with the timely and successful submission of any two assignments and one mini project(Optional)

Assignment-I	Assignment-II	Assignment-III	Project presentation

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1. Select a balanced (and an unbalanced) data. 2. Train on the complete data. (using fit) 3. Test on the complete data (using predict) 4. Observe the accuracy and the confusion matrix 5. Tune the hyperparameters (k, p, distance) and generate the kNN models 6. Analyze the results	Using a balanced and unbalanced dataset do the following: • feature scaling • split into train and split 10 times and report average performance • cross validate with 5 folds and 10 folds and report performance Do hyperparameter tuning for k, p, and distance • Document all results in a doc file in neat tables	1. Select a dataset which has not been worked on in the class 2. Clean null values and outliers 3. Handle categorical data 4. Scale/standardize the data 5. Select relevant features 6. Build models using Ann and Knn and other classifiers by tuning the hyperparameters 7. Systematically document the pipeline and all results 8. Also search and mention the past accuracies reported on this dataset by other researchers	Towards the end of the course, participants were asked to do a mini-project based on model building to make

Assign Date: 7th October 2023 Due Date: 19th October 2023	Assign Date: 14th October 2023 Due Date: 22nd October 2023	Assign Date: 4th November 2023 Due Date: 21st November 2023	Assign Date: 9th November 2023 Due Date: 24th November 2023

Regular Feedback

Additionally, time to time feedback was taken from students for the understanding part of the lecture, hands-on and speed as the subject was completely new to them. Also doubt sessions were kept on a regular basis after

every class. During the last session, a formal feedback was taken where students have shared their experience and views how the course has made them more comfortable with Machine Learning.

Question 2: Overall rating of the course

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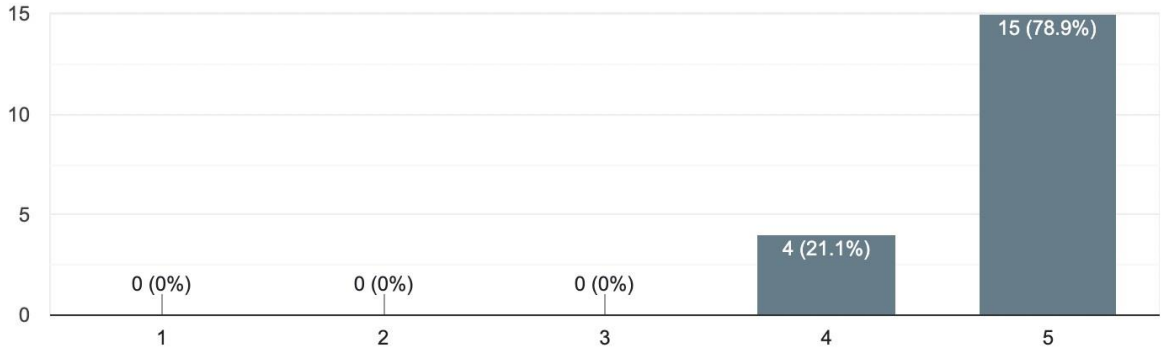
19 responses



Question 2: Did your understanding of Machine Learning improve while doing the project?

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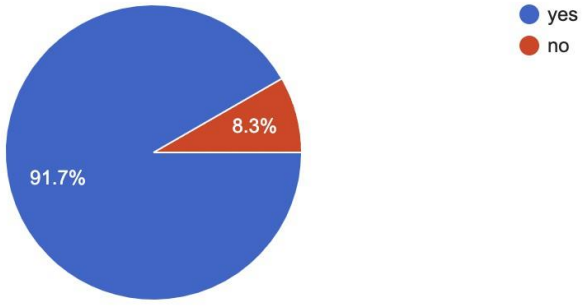
12 responses



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Overall the course was found to be a wonderful experience for the organizing team as well as participants. We believe that it has equipped participants with machine learning skills that they can apply in solving real life problems in potential areas of Physics and Electronics and in solving general challenges of the environment and health sector such as diabetes and heart disease diagnosis.