A REPORT OF

# ONE WEEK ONLINE STUDENT DEVELOPMENT PROGRAMME

ON

# MACHINE LEARNING WITH PYTHON

ORGANIZED BY

## DEPARTMENT OF COMPUTER SCIENCE AND APPLICATION

ATAL BIHARI VAJPAYEE VISHWAVIDYALAYA, BILASPUR (C.G.)

IN ASSOCIATION WITH

## E & ICT ACADEMY, IIT KANPUR

(UNDER MoU)

SUPPORTED BY

## IEEE CHAPETER

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATION

ATAL BIHARI VAJPAYEE VISHWAVIDYALAYA, BILASPUR (C.G.)

FROM

## 30 SEPTEMBER - 5 OCTOBER, 2024

# EVENT DETAIL

The Department of Computer Science and Application at Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur (C.G.), took a significant step towards advancing the technical skills of its students by organizing a comprehensive one-week online student development program on **Machine Learning with Python** from **September 30 to October 5, 2024**. This initiative was made possible through a collaboration with the **E & ICT Academy, IIT Kanpur**, and received additional support from the **IEEE Chapter**. The primary aim of the program was to enhance students' understanding of key machine learning concepts and to equip them with practical skills necessary for programming various machine learning algorithms using Python.

The program was overseen by **Dr. H.S. Hota**, the Head of the Department, serving as the Program Convenor, and **Dr. Shriya Sahu**, Assistant Professor, who acted as the Co-ordinator. Their leadership was instrumental in ensuring that the program ran smoothly and that participants received a high-quality learning experience. Each day of the program was meticulously planned to cover a specific set of topics within the vast field of machine learning. The schedule included interactive sessions that introduced students to the fundamental principles of machine learning, followed by focused discussions on various algorithms and their practical applications.

The first day of the program kicked off with an **introduction to machine learning** and an overview of **Python programming**. Participants were guided through the essentials of Python, which is widely regarded as the primary programming language for machine learning due to its simplicity and the powerful libraries it offers. This foundational knowledge prepared students for the more advanced topics that would follow.

On the second day, the focus shifted to **linear regression**, a fundamental algorithm that lays the groundwork for understanding more complex models. Students were engaged in both theoretical discussions and practical exercises, which helped them grasp how linear regression can be used for predictive analysis.

The third day introduced **logistic regression** and **support vector machines (SVM)**. These topics were crucial as they represent the transition from linear models to more complex algorithms capable of handling classification problems. Students were encouraged to participate actively, solving problems and writing code to reinforce their understanding.

# EVENT DETAIL

The fourth day delved into decision trees, a versatile machine learning technique that is easy to interpret and can be applied to both classification and regression tasks. The hands-on sessions allowed students to build decision trees from scratch, enhancing their programming and analytical skills.

The fifth day was dedicated to neural networks and the backpropagation algorithm, which are at the core of modern machine learning applications, particularly in deep learning. The students learned about the architecture of neural networks and how backpropagation works to optimize model parameters, further enriching their understanding of complex machine learning systems.

On the final day, participants engaged in project work, where they applied the knowledge and skills they had acquired throughout the week. This culminated in a Q&A session, allowing students to clarify doubts and discuss their projects with the instructors.

The feedback received from participants was overwhelmingly positive, with many expressing their gratitude for the opportunity to learn from esteemed faculty members and industry experts. Students appreciated the interactive nature of the sessions, which facilitated better understanding and engagement with the material. The program not only successfully met its objectives but also fostered a deep interest in data science and machine learning among the participants.

In conclusion, the one-week online student development program on Machine Learning with Python represented a significant investment in the future of students at Atal Bihari Vajpayee Vishwavidyalaya. It provided a comprehensive overview of machine learning concepts and equipped students with practical programming skills necessary to excel in the rapidly evolving field of data science. The collaboration between the Department of Computer Science and Application, IIT Kanpur, and the IEEE Chapter proved to be a successful model for enhancing technical education, and it paved the way for future initiatives aimed at empowering students in advanced technology fields. The program not only enriched the participants' knowledge but also fostered a vibrant learning community that is essential for growth in the tech industry.

# EVENT FLYER

**Department of Computer Science & Application**
Atal Bihari Vajpayee University, Bilaspur (C.G.)

**ONE WEEK**

**ONLINE STUDENT DEVELOPMENT PROGRAMME**

# MACHINE LEARNING WITH PYTHON

*in Association with*

**EICT Academy, IIT Kanpur**
**(Under MOU)**

*Supported by*

**IEEE Chapeter**
Department of Computer Science & Application

**30 Sep to 05 Oct , 2024**

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**Convenor**

**DR. H. S. HOTA**
Prof. & Head, Dept. of CSA
Atal Bihari Vajpayee University
Bilaspur (C.G.)

**Coordinator**

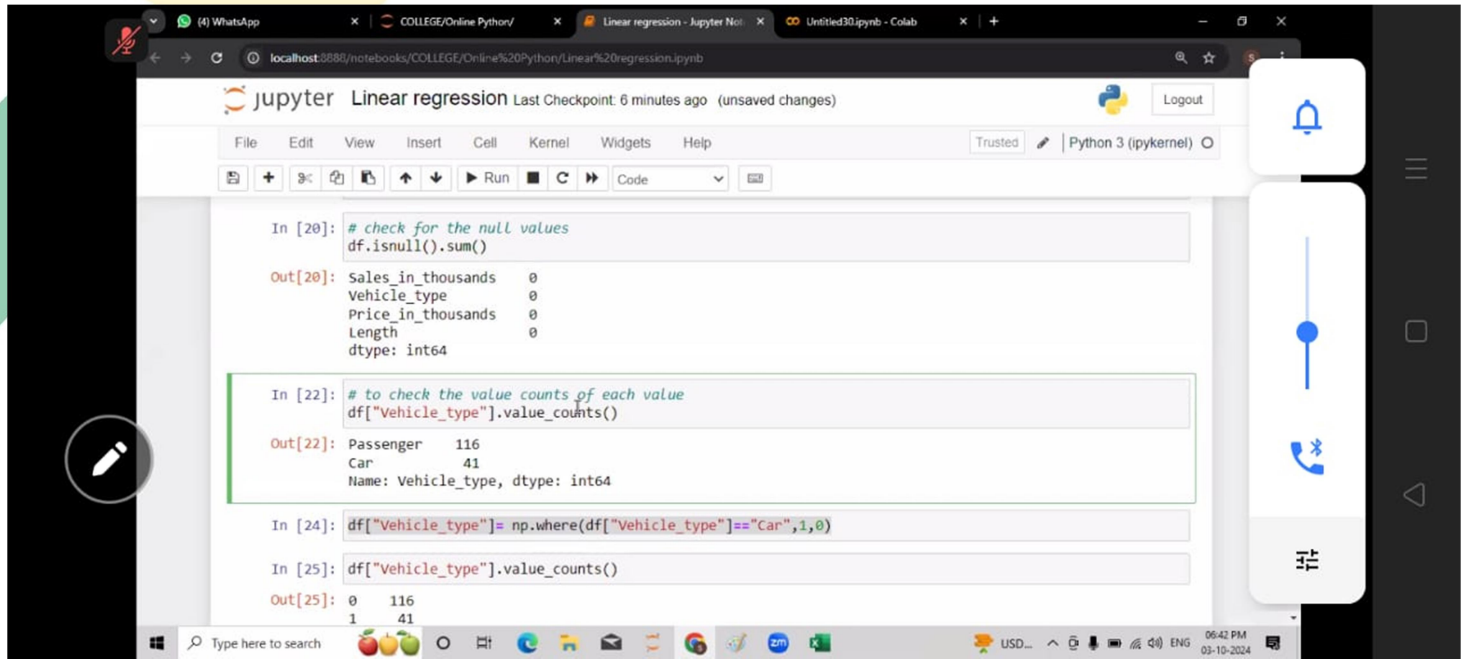
**DR. SHRIYA SAHU**
Assistant Professor
Atal Bihari Vajpayee University
Bilaspur (C.G.)

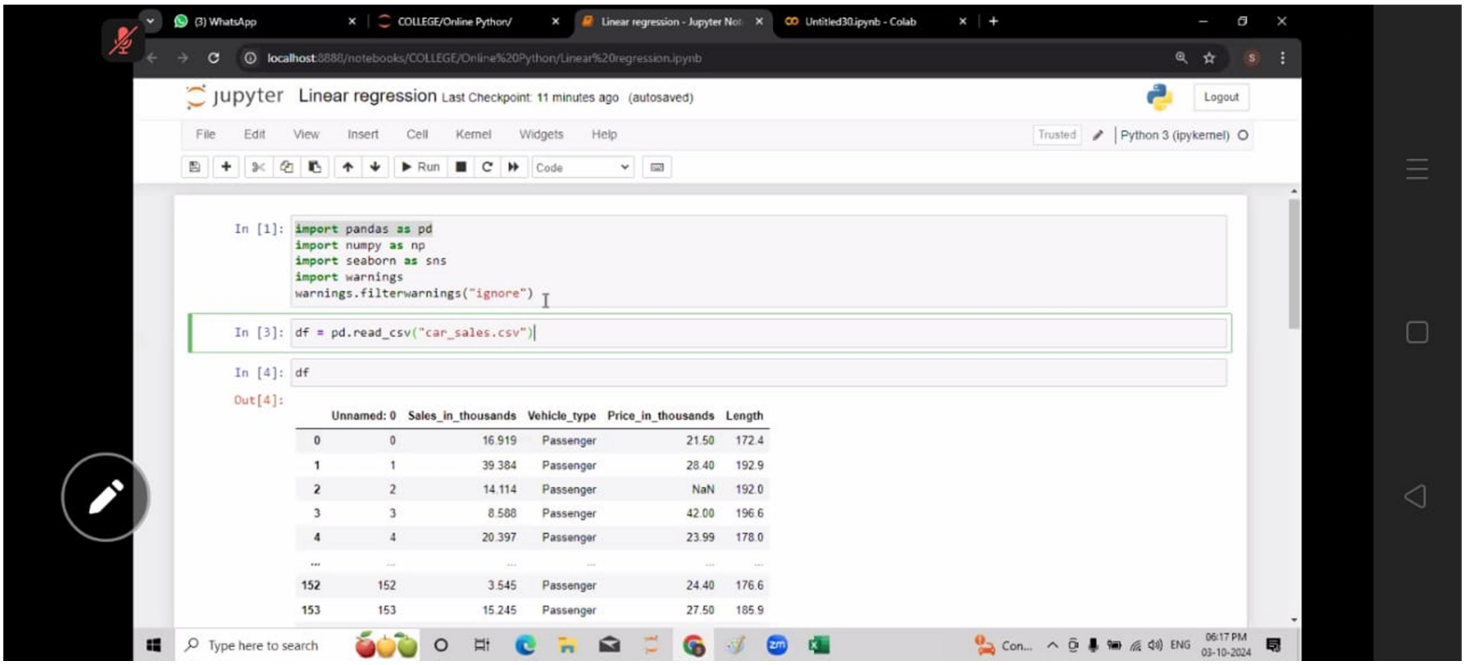
**Register Now!**

**Certificate by IIT Kanpur**

**More Information :**
**+91 83492 43439**

# GLIMPSES


jupyter Linear regression Last Checkpoint: 6 minutes ago (unsaved changes)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted Python 3 (ipykernel)
Run Code
In [20]: # check for the null values
df.isnull().sum()
Out[20]: Sales_in_thousands 0
Vehicle_type 0
Price_in_thousands 0
Length 0
dtype: int64
In [22]: # to check the value counts of each value
df["Vehicle_type"].value_counts()
Out[22]: Passenger 116
Car 41
Name: Vehicle_type, dtype: int64
In [24]: df["Vehicle_type"]= np.where(df["Vehicle_type"]=="Car",1,0)
In [25]: df["Vehicle_type"].value_counts()
Out[25]: 0 116
1 41
Type here to search


jupyter Linear regression Last Checkpoint: 11 minutes ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted Python 3 (ipykernel)
Run Code
In [1]: import pandas as pd
import numpy as np
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
In [3]: df = pd.read_csv("car_sales.csv")
In [4]: df
Out[4]:
Unnamed: 0 Sales_in_thousands Vehicle_type Price_in_thousands Length
0 0 16.919 Passenger 21.50 172.4
1 1 39.384 Passenger 28.40 192.9
2 2 14.114 Passenger NaN 192.0
3 3 8.588 Passenger 42.00 196.6
4 4 20.397 Passenger 23.99 178.0
152 152 3.545 Passenger 24.40 176.6
153 153 15.245 Passenger 27.50 185.9
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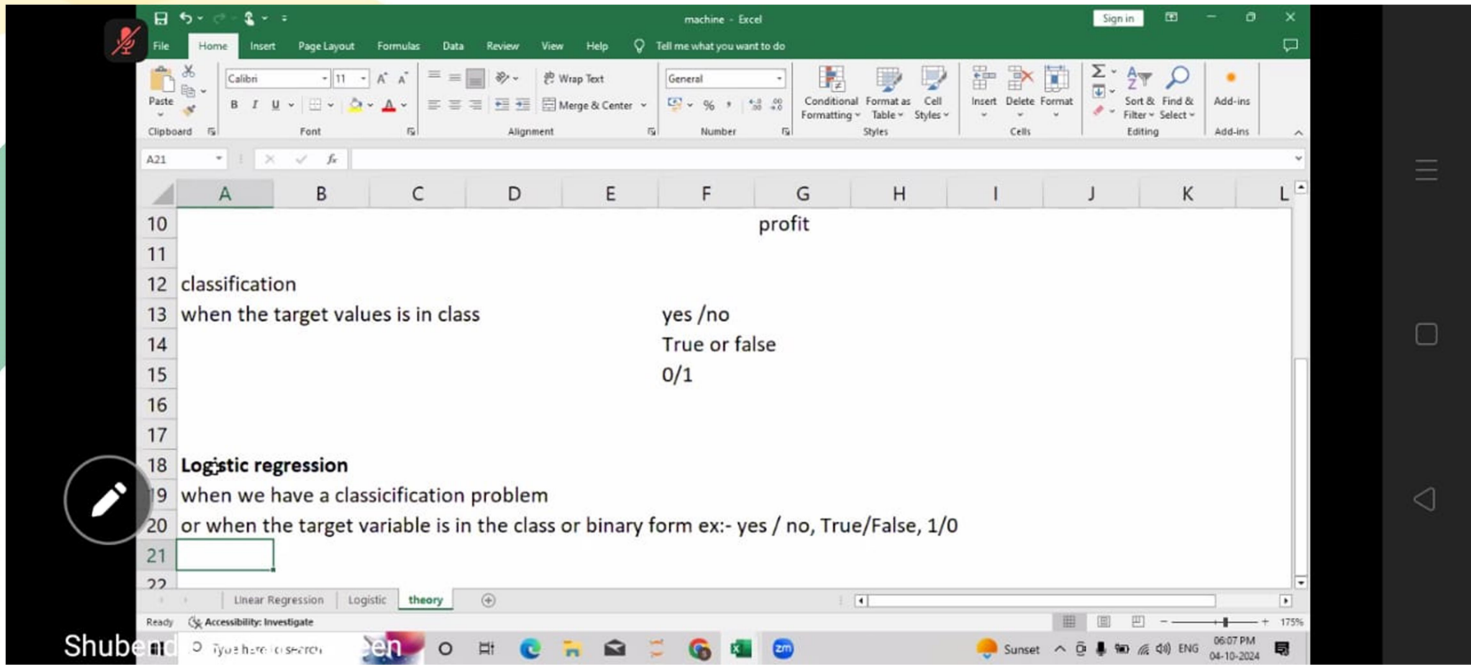
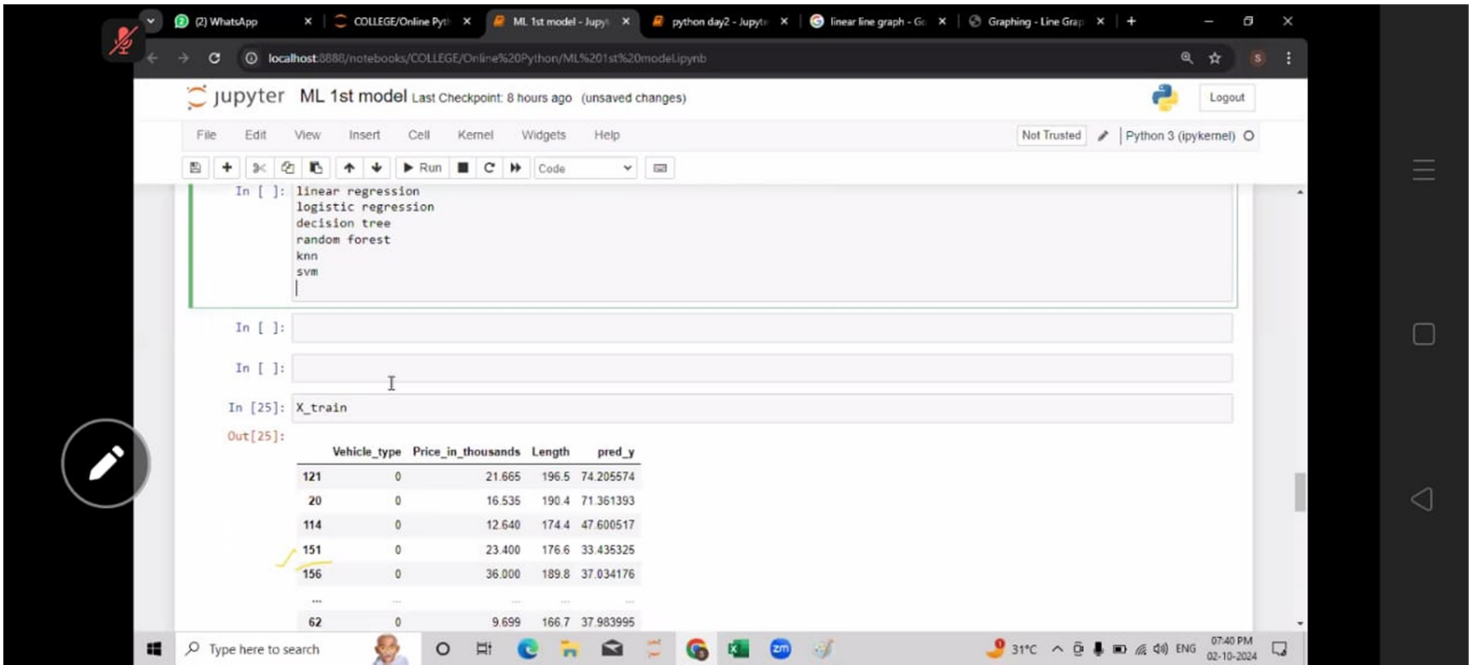
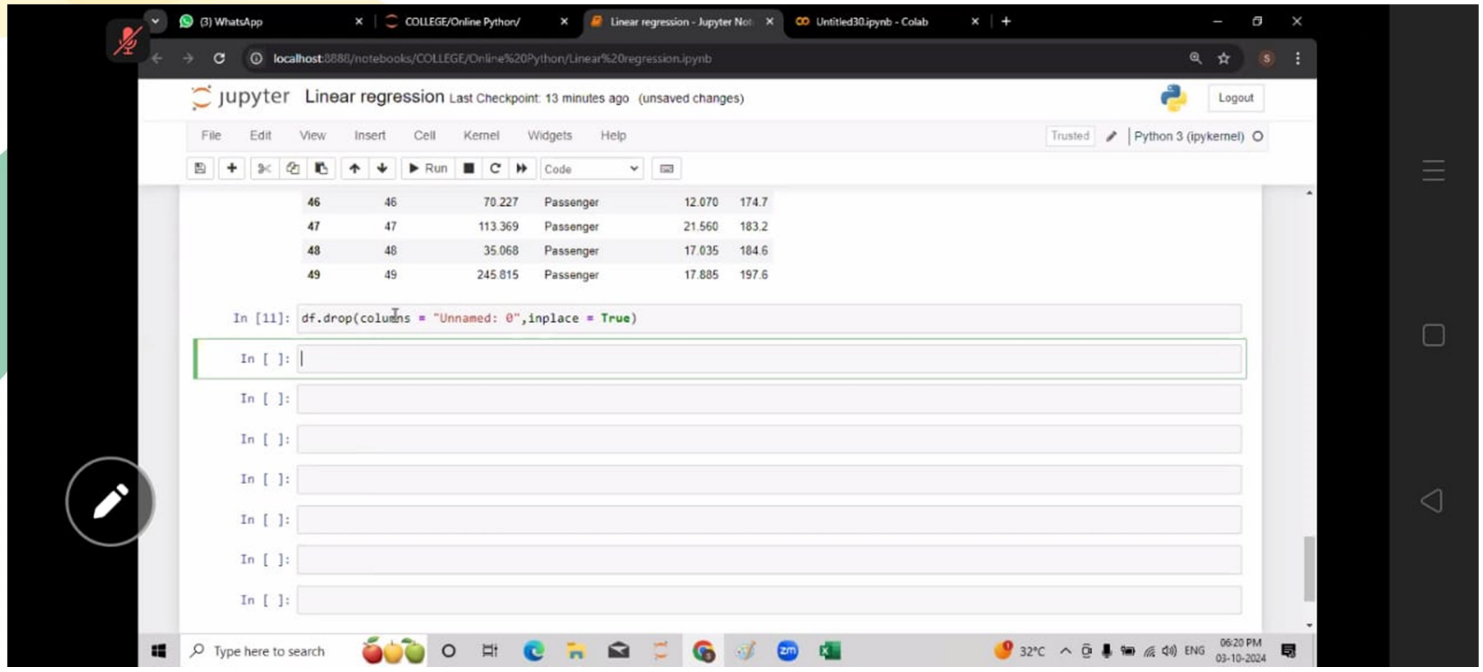
# GLIMPSES


machine - Excel
profit
classification
when the target values is in class
yes /no
True or false
0/1
Logistic regression
when we have a classicification problem
or when the target variable is in the class or binary form ex:- yes / no, True/False, 1/0
Linear Regression
Logistic
theory


ML 1st model - Jupyter
jupyter ML 1st model Last Checkpoint: 8 hours ago (unsaved changes)
linear regression
logistic regression
decision tree
random forest
knn
svm
In [25]: X_train
Out[25]:
Vehicle_type Price_in_thousands Length pred_y
121 0 21.665 196.5 74.205574
20 0 16.535 190.4 71.361393
114 0 12.640 174.4 47.600517
151 0 23.400 176.6 33.435325
156 0 36.000 189.8 37.034176
62 0 9.699 166.7 37.983995

# GLIMPSES


jupyter Linear regression Last Checkpoint: 13 minutes ago (unsaved changes)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted Python 3 (ipykernel)
Run Code
46 46 70.227 Passenger 12.070 174.7
47 47 113.369 Passenger 21.560 183.2
48 48 35.068 Passenger 17.035 184.6
49 49 245.815 Passenger 17.885 197.6
In [11]: df.drop(columns = "Unnamed: 0",inplace = True)
In [ ]:
In [ ]:
In [ ]:
In [ ]:
In [ ]:
In [ ]:
In [ ]:
Type here to search
32°C
ENG
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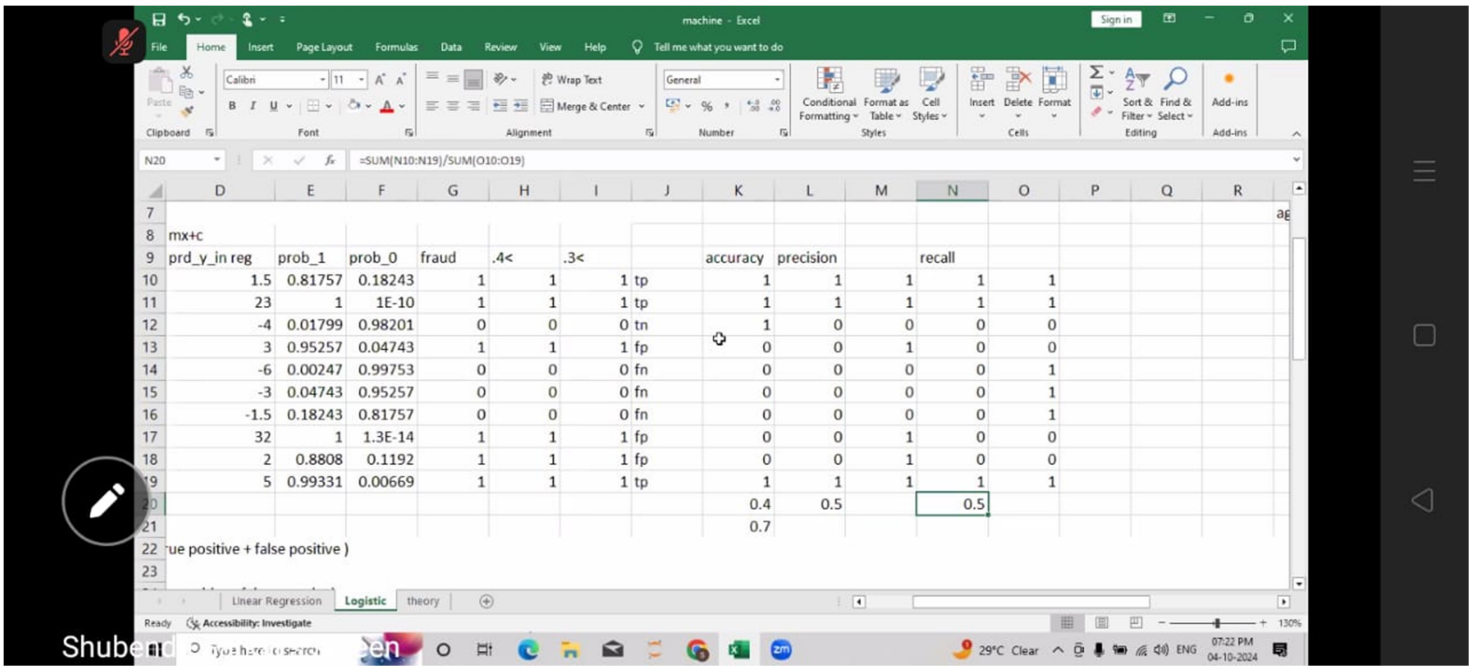
03-10-2024


machine - Excel
Sign in
File Home Insert Page Layout Formulas Data Review View Help Tell me what you want to do
Clipboard Font Alignment Number Styles Cells Editing Add-ins
N20
=SUM(N10:N19)/SUM(O10:O19)
mx+c
prd_y_in reg prob_1 prob_0 fraud .4< .3< accuracy precision recall
1.5 0.81757 0.18243 1 1 1 tp 1 1 1 1 1
23 1 1E-10 1 1 1 tp 1 1 1 1 1
-4 0.01799 0.98201 0 0 0 tn 1 0 0 0 0
3 0.95257 0.04743 1 1 1 fp 0 0 1 0 0
-6 0.00247 0.99753 0 0 0 fn 0 0 0 0 1
-3 0.04743 0.95257 0 0 0 fn 0 0 0 0 1
-1.5 0.18243 0.81757 0 0 0 fn 0 0 0 0 1
32 1 1.3E-14 1 1 1 fp 0 0 1 0 0
2 0.8808 0.1192 1 1 1 fp 0 0 1 0 0
5 0.99331 0.00669 1 1 1 tp 1 1 1 1 1
0.4 0.5 0.5
0.7
ue positive + false positive )
Linear Regression Logistic theory
Ready Accessibility: Investigate
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29°C Clear
ENG
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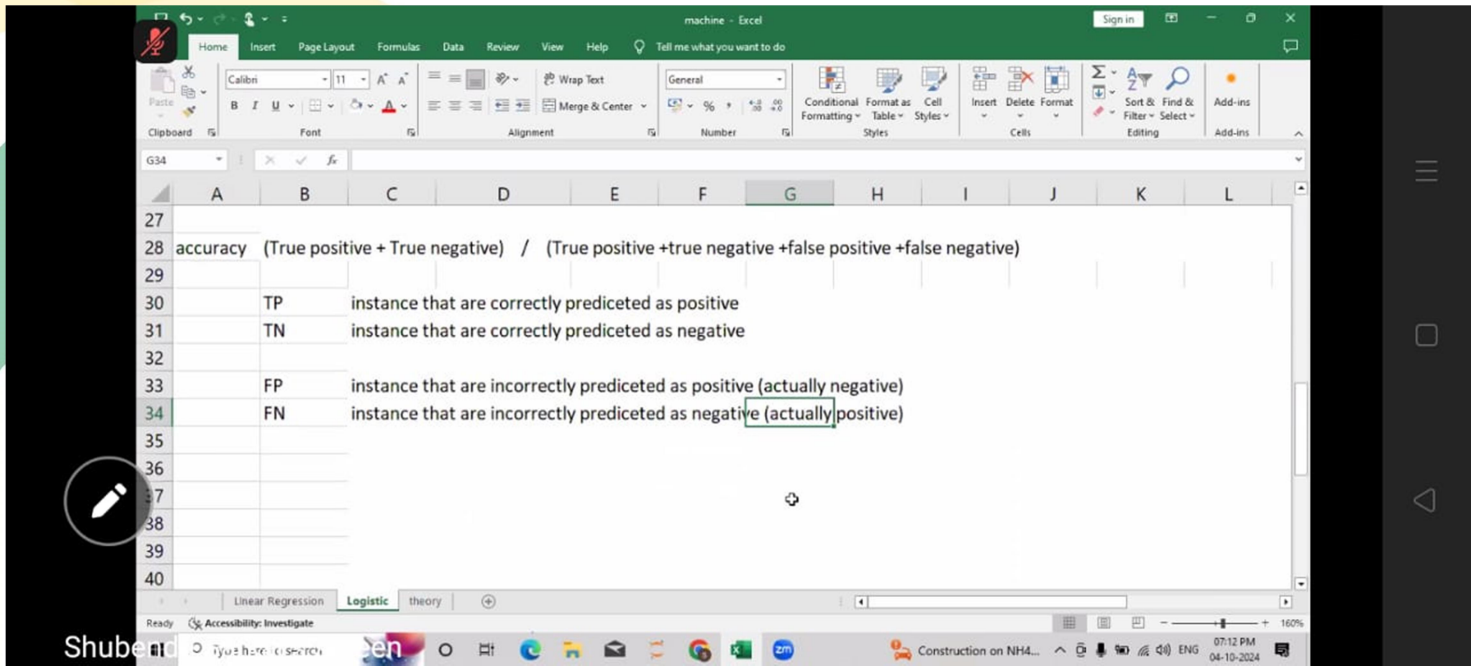
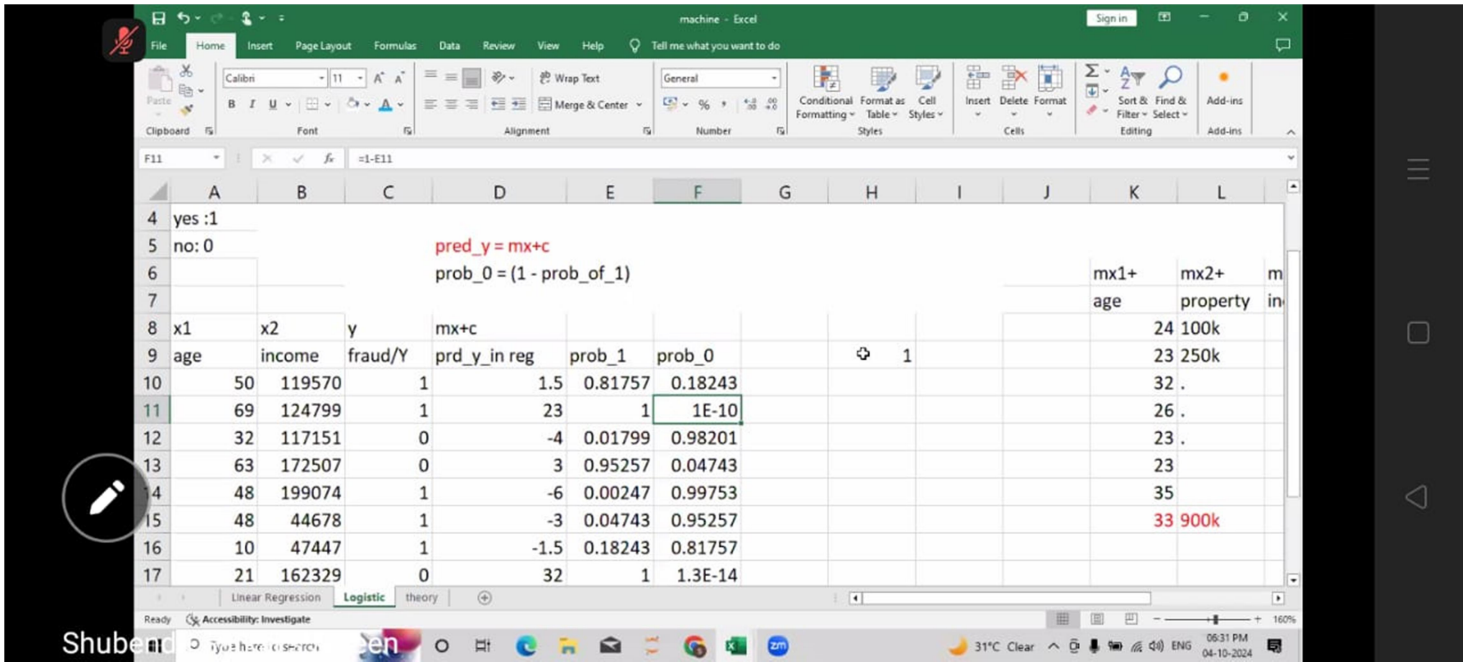
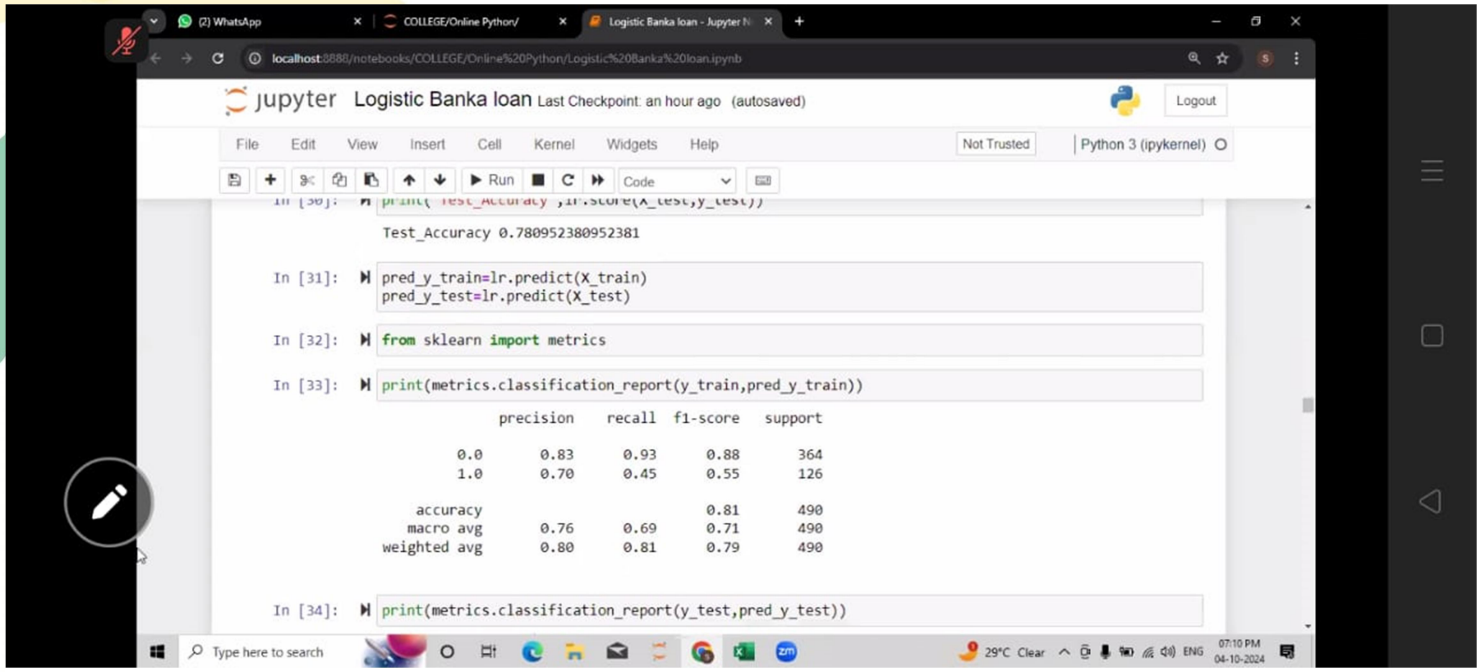
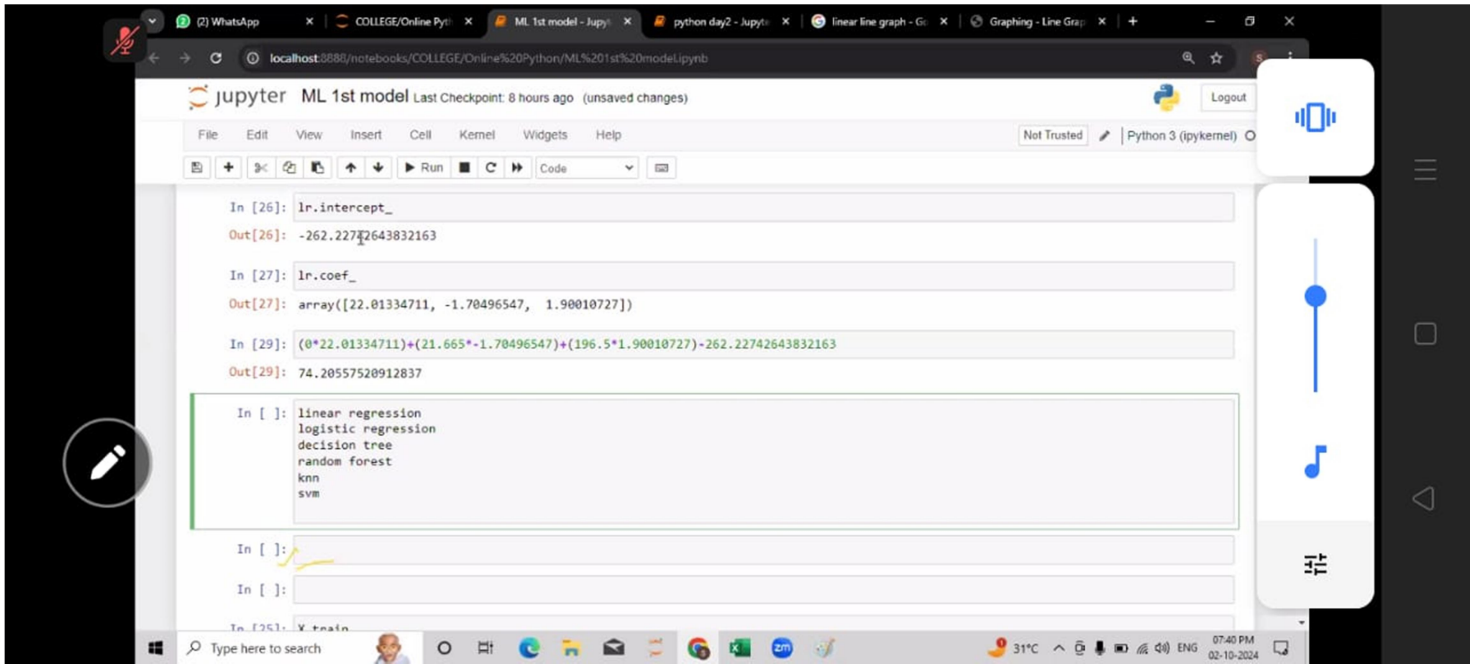
# GLIMPSES


machine - Excel
accuracy (True positive + True negative) / (True positive +true negative +false positive +false negative)
TP instance that are correctly prediceted as positive
TN instance that are correctly prediceted as negative
FP instance that are incorrectly prediceted as positive (actually negative)
FN instance that are incorrectly prediceted as negative (actually positive)
Linear Regression
Logistic
theory

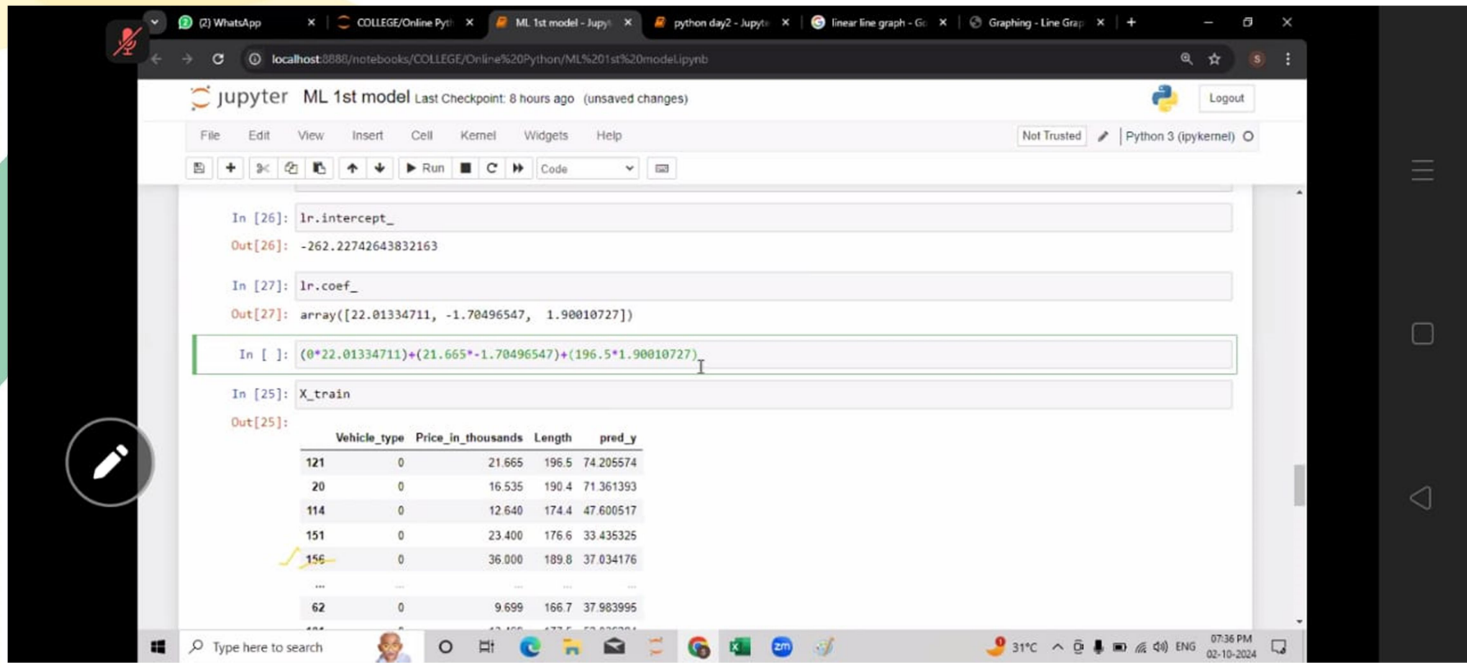

machine - Excel
yes :1
no: 0
pred_y = mx+c
prob_0 = (1 - prob_of_1)
x1 x2 y mx+c prob_1 prob_0
age income fraud/Y prd_y_in reg
50 119570 1 1.5 0.81757 0.18243
69 124799 1 23 1 1E-10
32 117151 0 -4 0.01799 0.98201
63 172507 0 3 0.95257 0.04743
48 199074 1 -6 0.00247 0.99753
48 44678 1 -3 0.04743 0.95257
10 47447 1 -1.5 0.18243 0.81757
21 162329 0 32 1 1.3E-14
mx1+ age
mx2+ property
24 100k
23 250k
33 900k
Linear Regression
Logistic
theory

# GLIMPSES


jupyter Logistic Banka loan Last Checkpoint: an hour ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Test_Accuracy 0.780952380952381
In [31]:
pred_y_train=lr.predict(X_train)
pred_y_test=lr.predict(X_test)
In [32]:
from sklearn import metrics
In [33]:
print(metrics.classification_report(y_train,pred_y_train))
precision recall f1-score support
0.0 0.83 0.93 0.88 364
1.0 0.70 0.45 0.55 126
accuracy 0.81 490
macro avg 0.76 0.69 0.71 490
weighted avg 0.80 0.81 0.79 490
In [34]:
print(metrics.classification_report(y_test,pred_y_test))
Type here to search


jupyter ML 1st model Last Checkpoint: 8 hours ago (unsaved changes)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
In [26]:
lr.intercept_
Out[26]:
-262.22742643832163
In [27]:
lr.coef_
Out[27]:
array([22.01334711, -1.70496547, 1.90010727])
In [29]:
(0*22.01334711)+(21.665*-1.70496547)+(196.5*1.90010727)-262.22742643832163
Out[29]:
74.20557520912837
In [ ]:
linear regression
logistic regression
decision tree
random forest
knn
svm
In [ ]:
In [ ]:
Type here to search

# GLIMPSES


jupyter ML 1st model Last Checkpoint: 8 hours ago (unsaved changes)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted Python 3 (ipykernel)
In [26]: lr.intercept_
Out[26]: -262.22742643832163
In [27]: lr.coef_
Out[27]: array([22.01334711, -1.70496547, 1.90010727])
In [ ]: (0*22.01334711)+(21.665*-1.70496547)+(196.5*1.90010727)
In [25]: X_train
Out[25]:
Vehicle_type Price_in_thousands Length pred_y
121 0 21.665 196.5 74.205574
20 0 16.535 190.4 71.361393
114 0 12.640 174.4 47.600517
151 0 23.400 176.6 33.435325
156 0 36.000 189.8 37.034176
62 0 9.699 166.7 37.983995
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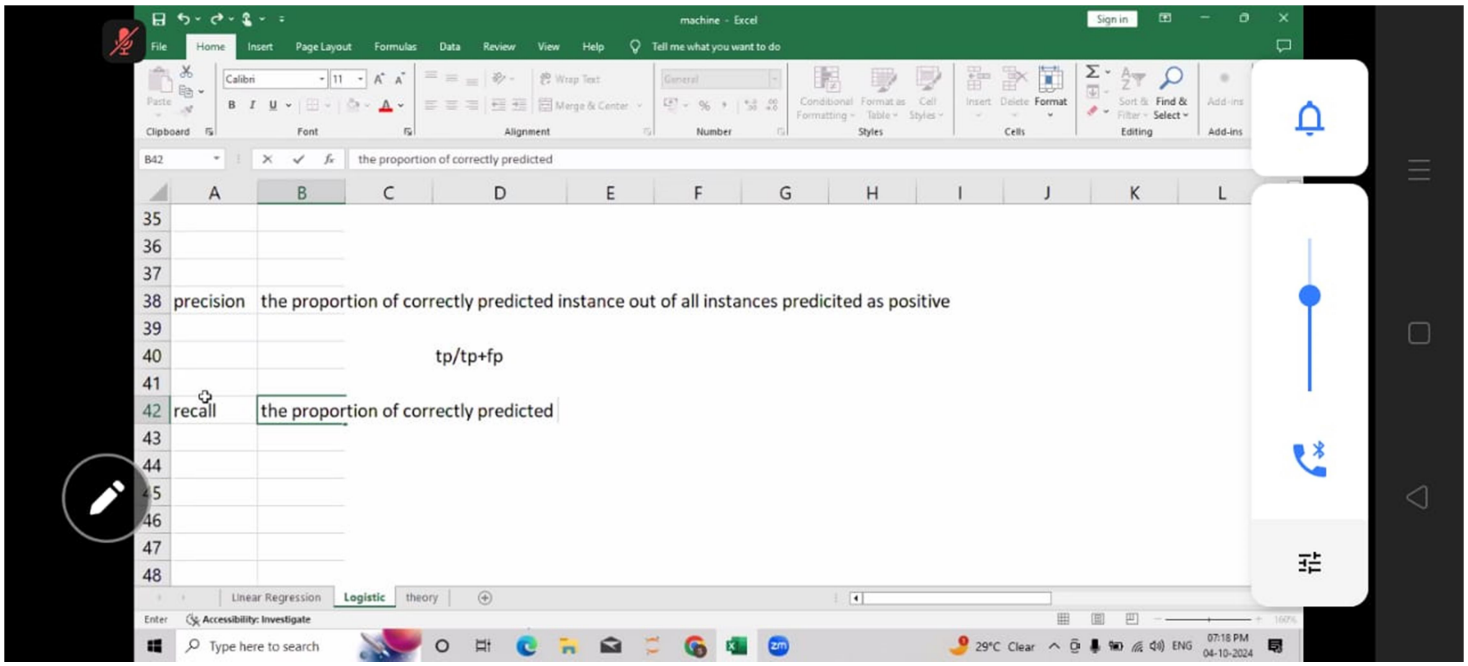
machine - Excel
B42 the proportion of correctly predicted
precision the proportion of correctly predicted instance out of all instances predicited as positive
tp/tp+fp
recall the proportion of correctly predicted
Linear Regression Logistic theory
Type here to search

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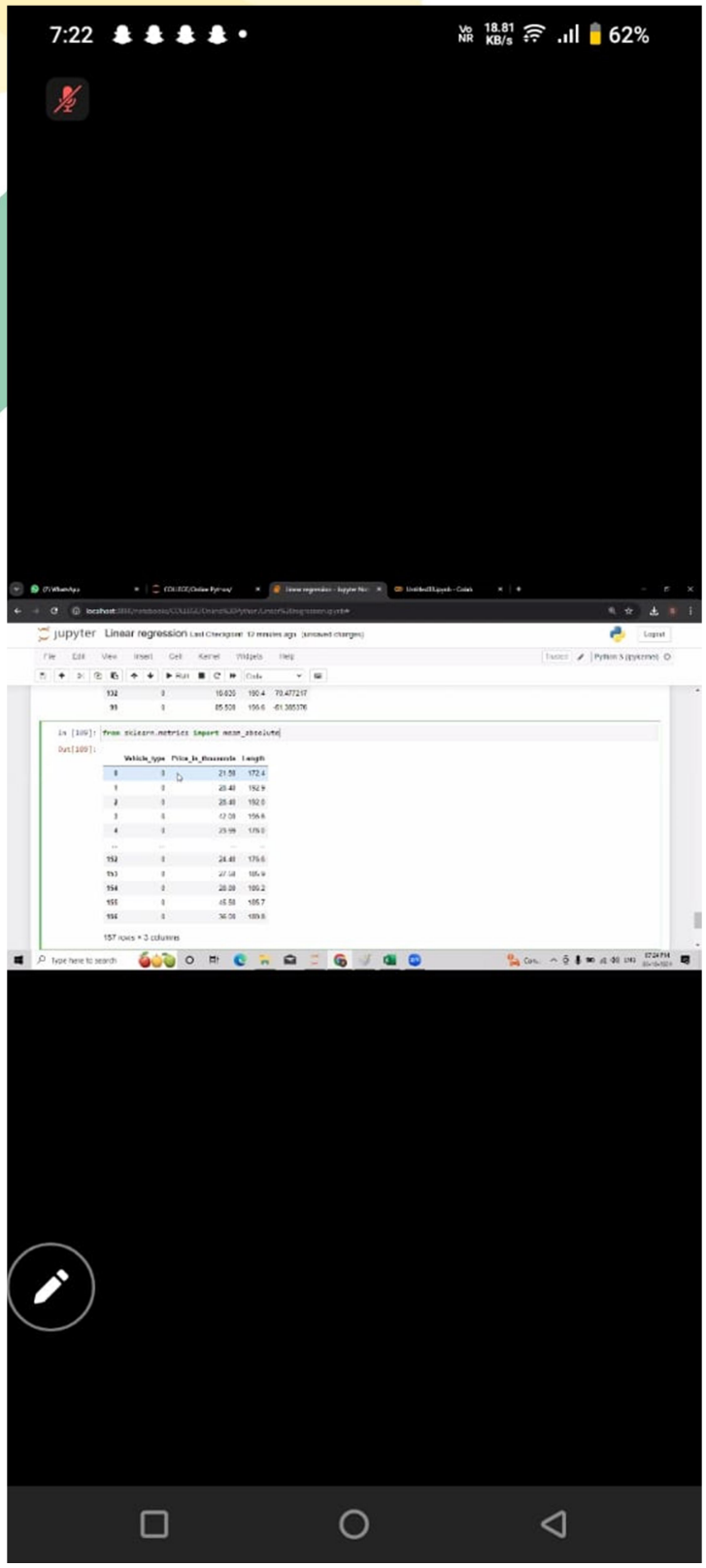
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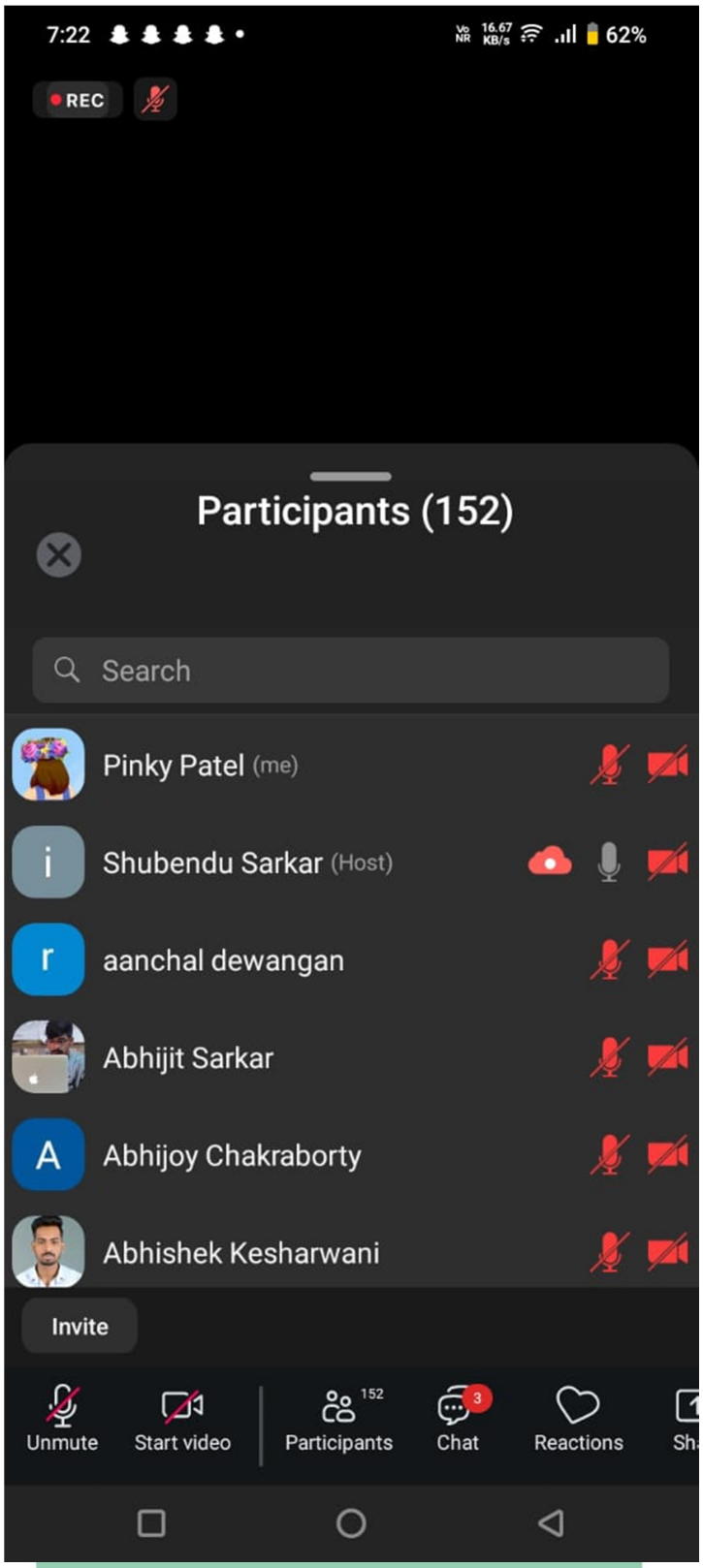
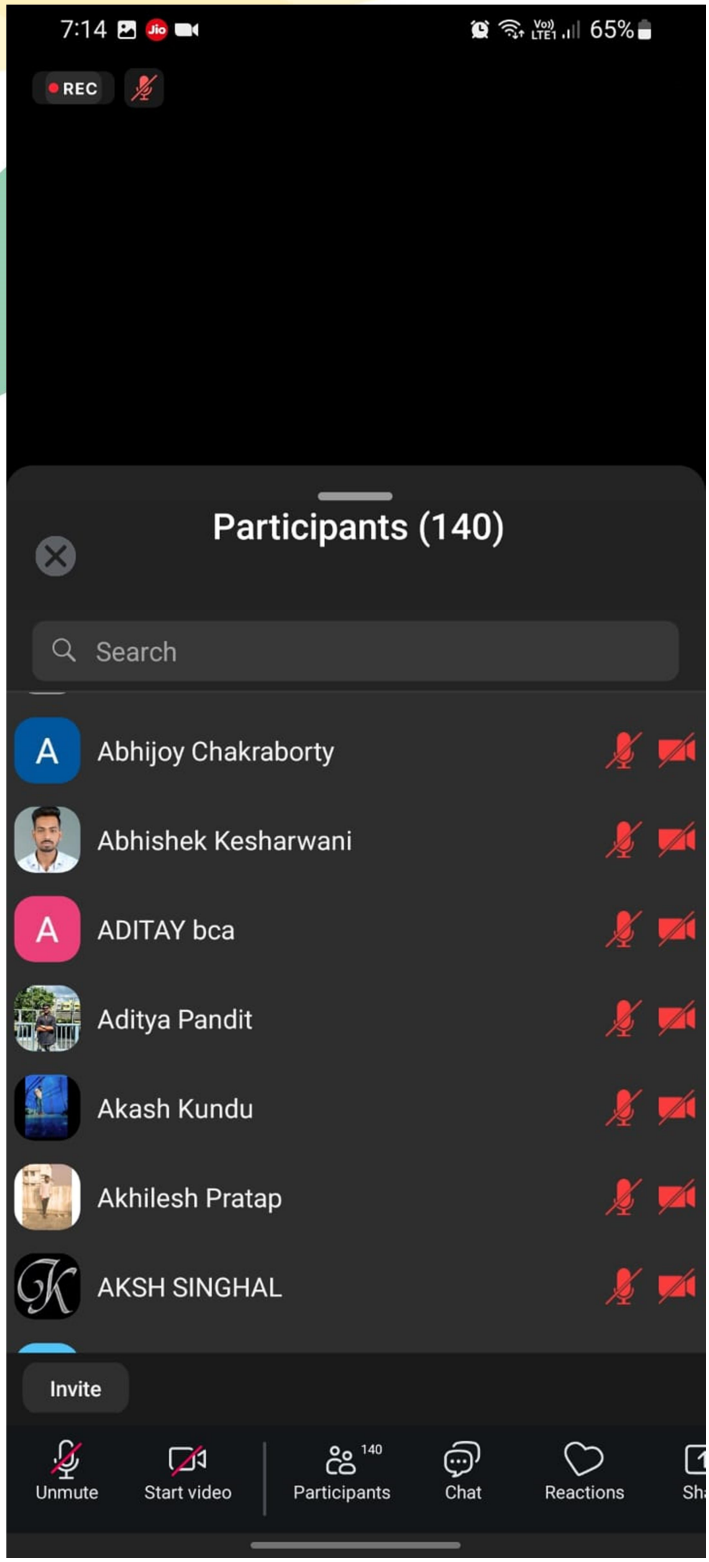
jupyter Linear regression


7:22
62%
REC
Participants (152)
Search
Pinky Patel (me)
Shubendu Sarkar (Host)
aanchal dewangan
Abhijit Sarkar
Abhijoy Chakraborty
Abhishek Kesharwani
Invite
Unmute
Start video
Participants
Chat
Reactions

# GLIMPSES


7:14
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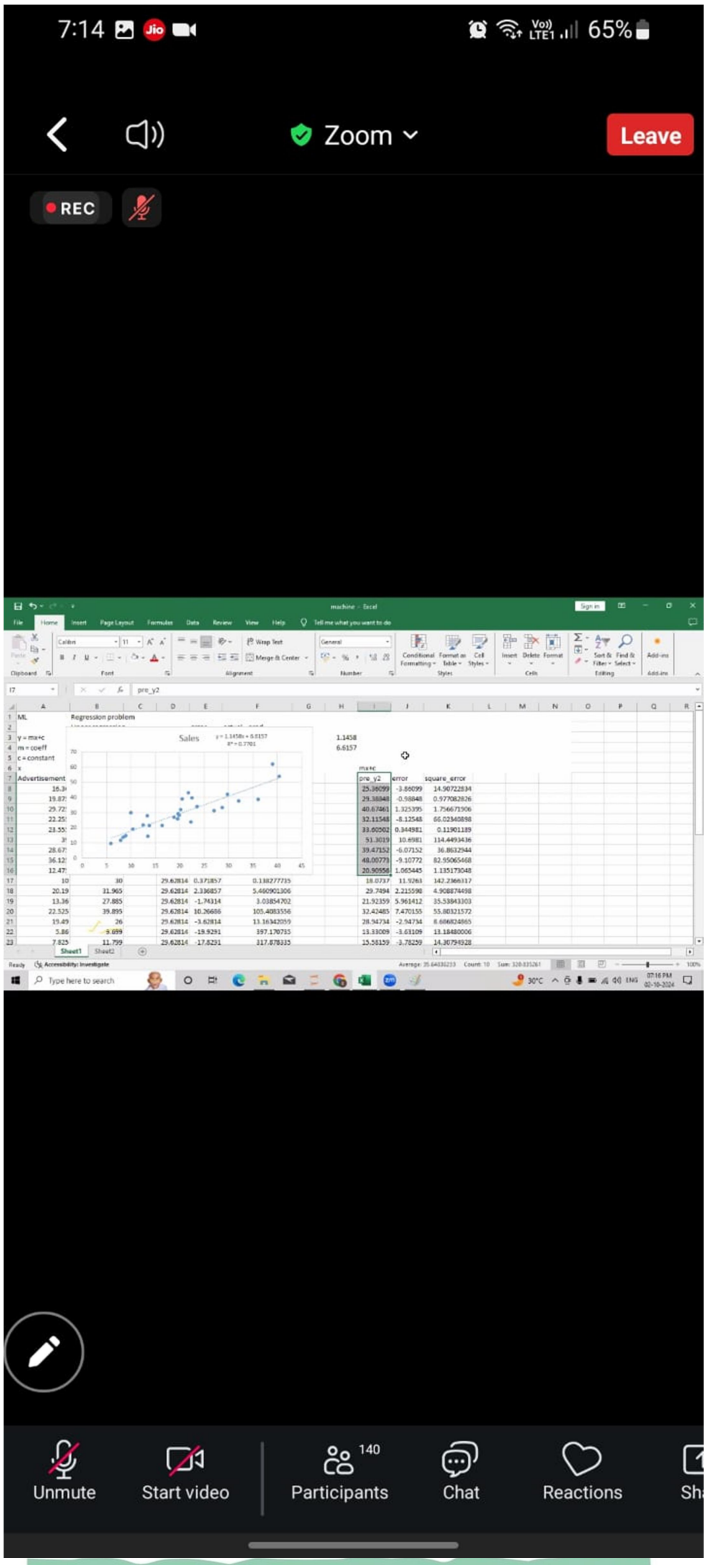
Participants (140)
Search
Abhijoy Chakraborty
Abhishek Kesharwani
ADITAY bca
Aditya Pandit
Akash Kundu
Akhilesh Pratap
AKSH SINGHAL
Invite
Unmute
Start video
140
Participants
Chat
Reactions


7:14
65%
Zoom
Leave
REC
Unmute
Start video
140
Participants
Chat
Reactions

| S.NO. | NAME | CLASS |
|---|---|---|
| 1 | Aanchal Dewangan | MCA-III Semester |
| 2 | Abhishek Kamal | M.Sc.(CS) - III Semester |
| 3 | Abhishek Kesharwani | MCA-III Semester |
| 4 | Akanksha Gautam | MCA-III Semester |
| 5 | Akanksha Singaur | MCA-III Semester |
| 6 | Akhil Mishra | B.Sc.(CS) - V Semester |
| 7 | Aman Kaiwart | B.Sc.(CS) - V Semester |
| 8 | Anjali Khargvanshi | MCA-III Semester |
| 9 | Anjali Tomar | B.Sc.(CS) - V Semester |
| 10 | Anjani Kashyap | MCA-III Semester |
| 11 | Avinash Tiwari | MCA-III Semester |
| 12 | Ayush Jaiswal | B.Sc.(CS) - V Semester |
| 13 | Bhushan Kumar Kashyap | Research Schlor |
| 14 | Bhuwan Singh Karsh | MCA-III Semester |
| 15 | Deepshikha Dahire | MCA-III Semester |
| 16 | Devlal Patel | M.Sc.(CS) - III Semester |
| 17 | Dhaneshwar Suryavanshi | Research Schlor |
| 18 | Dimpal Patel | B.Sc.(CS) - V Semester |
| 19 | Disha Chandel | B.Sc.(CS) - V Semester |
| 20 | Geetanjali Soni | MCA-III Semester |
| 21 | Kamal Gavel | Research Schlor |
| 22 | Khushi Dewangan | MCA-III Semester |
| 23 | Kriparam Kanwar | MCA-III Semester |
| 24 | Kuldeep Sahu | MCA-III Semester |
| 25 | Lema Dewangan | M.Sc.(CS) - III Semester |
| 26 | Lokeshwar Kashyap | B.Sc.(CS) - V Semester |
| 27 | Luv Kumar Sahu | B.Sc.(CS) - V Semester |
| 28 | Neda Khan Khokhar | MCA-III Semester |
| 29 | Nisha Kumbhkar | MCA-III Semester |

| | | |
|---|---|---|
| 30 | Nitesh Dinkar | MCA-III Semester |
| 31 | Nitesh Garhewal | B.Sc.(CS) - V Semester |
| 32 | Novesh Chandra | B.Sc.(CS) - V Semester |
| 33 | Nupur Shukla | B.Sc.(CS) - V Semester |
| 34 | Pinky Patel | MCA-III Semester |
| 35 | Pooja Kaiwart | MCA-III Semester |
| 36 | Poonam Kesharwani | MCA-III Semester |
| 37 | Priti Kashyap | MCA-III Semester |
| 38 | Pushpalata Sahu | MCA-III Semester |
| 39 | Puspesh Kashyap | Research Schlor |
| 40 | Putul Kumari | M.Sc.(CS) - III Semester |
| 41 | Rameshwar Joshi | M.Sc.(CS) - III Semester |
| 42 | Ravindra Kumar Shriwas | MCA-III Semester |
| 43 | Rohit Singh Thakur | MCA-III Semester |
| 44 | Saransh Singh | B.Sc.(CS) - V Semester |
| 45 | Saumya Dewangan | MCA-III Semester |
| 46 | Shiva Kumar Kewat | MCA-III Semester |
| 47 | Shivangi Pandey | MCA-III Semester |
| 48 | Shivangi Pathak | MCA-III Semester |
| 49 | Shriti Dansena | MCA-III Semester |
| 50 | Sumit Soni | B.Sc.(CS) - V Semester |
| 51 | Sumita Samanta | MCA-III Semester |
| 52 | Suprit Banerjee | MCA-III Semester |
| 53 | Svejal Gupta | MCA-III Semester |
| 54 | Swapnil Pandey | MCA-III Semester |
| 55 | Tanisha | MCA-III Semester |
| 56 | Tanu Bharti | MCA-III Semester |
| 57 | Tanya Gupta | M.Sc.(CS) - III Semester |
| 58 | Tumesh | MCA-III Semester |
| 59 | Vasudev | M.Sc.(CS) - III Semester |