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Branch	**Computer Science and Engineering (CSE)**
Academic Year & Semester	**2024-2025 & Semester 1**
Date of Performance	**03/10/2024**
Title of Assignment:	**Hands-on Exploration of AI and ML Fundamentals: A Practical Approach to Model Pipeline, Data Mining, and Interfacing using Online Open-Source Tools.**

Theory:

1. Introduction to Tinkering, AIML, Data and Orange data mining tool.

1.1 Tinkering

Tinkering is all about experimentation, curiosity and hands on learning. It involves playing around with materials, tools, and technologies to understand how things work, make improvements or create something new. It’s a mindset as much as skillset, encouraging creativity, problem solving and continuous learning. Tinkering encourages curiosity, adaptability, and an inventive mindset. Whether it's fixing a gadget, crafting a DIY project, or exploring coding, it embodies a spirit of learning through doing. In a world that values both creativity and technical skills, tinkering is a powerful way to merge the two.

1.2 Artificial Intelligence and Machine Learning (AIML) and Data

AIML have revolutionized the way we interact with technology. These fields rely heavily on data – the raw materials that fuels their development. Data serves as the foundation for training ML models, allowing them to learn patterns, make predictions and continuously improve their performance. In AIML, data can come in various forms—structured data like spreadsheets, unstructured data like text and images, or semi-structured data like emails. The process starts with data collection and preprocessing, which involves cleaning and transforming data into a usable format. Next, this data is used to train models, where algorithms learn from patterns in the data to make accurate predictions or decisions. The quality and quantity of data are crucial for building effective AI models. The more relevant and high-quality data you have, the better your models will perform.

1.3 Orange Data Mining Tool

Orange Data Mining Tool is a powerful, open-source data mining and machine learning tool. It’s designed for both beginners and experts, offering an easy to use visual programming interface. With, orange, we can perform tasks like data visualization, processing and analysis without writing any code. One of Orange's most distinctive features is its visual programming interface. This workbench allows you to create data analysis workflows by simply connecting components together. Each component represents a specific task, such as data loading, pre-processing, modelling, and visualization. While Orange's visual interface is powerful, you can also write Python scripts to customize the tool and extend its functionality. This is particularly useful for advanced users who need to implement complex algorithms or perform custom data manipulations. Orange can be integrated with other data science tools, such as Python libraries like NumPy, pandas, and scikit-learn. This allows you to leverage the strengths of different tools and create more sophisticated data analysis workflows.

Output

1. Data import and its understanding:

Output screenshots here:

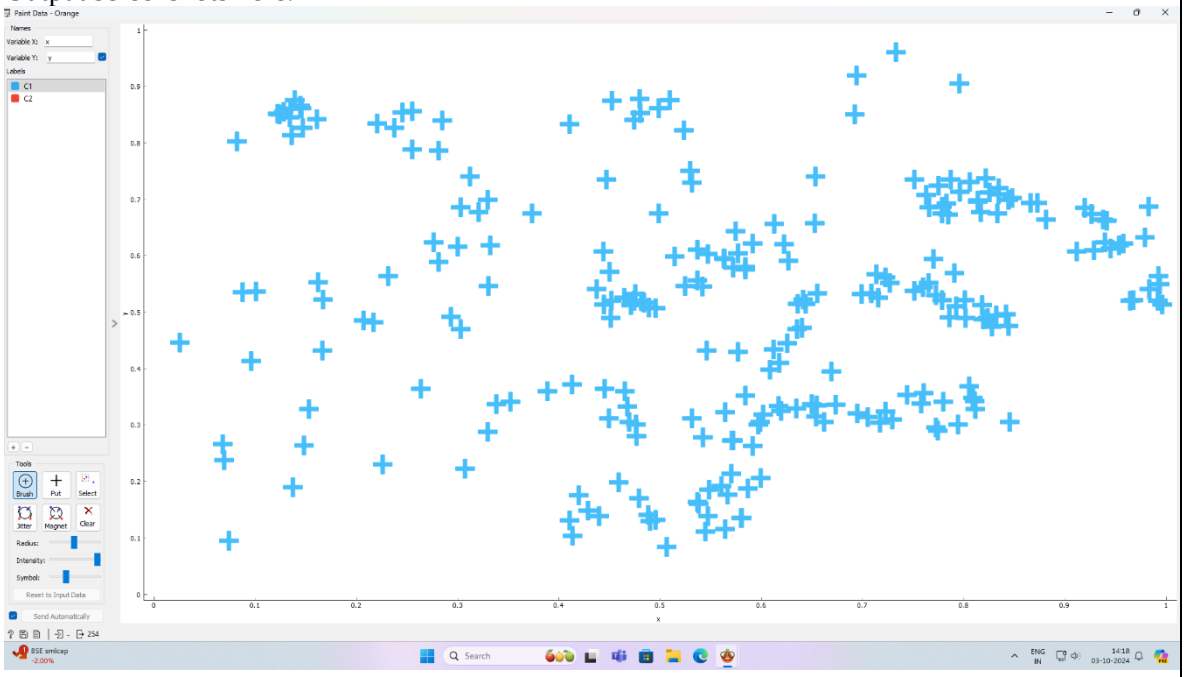
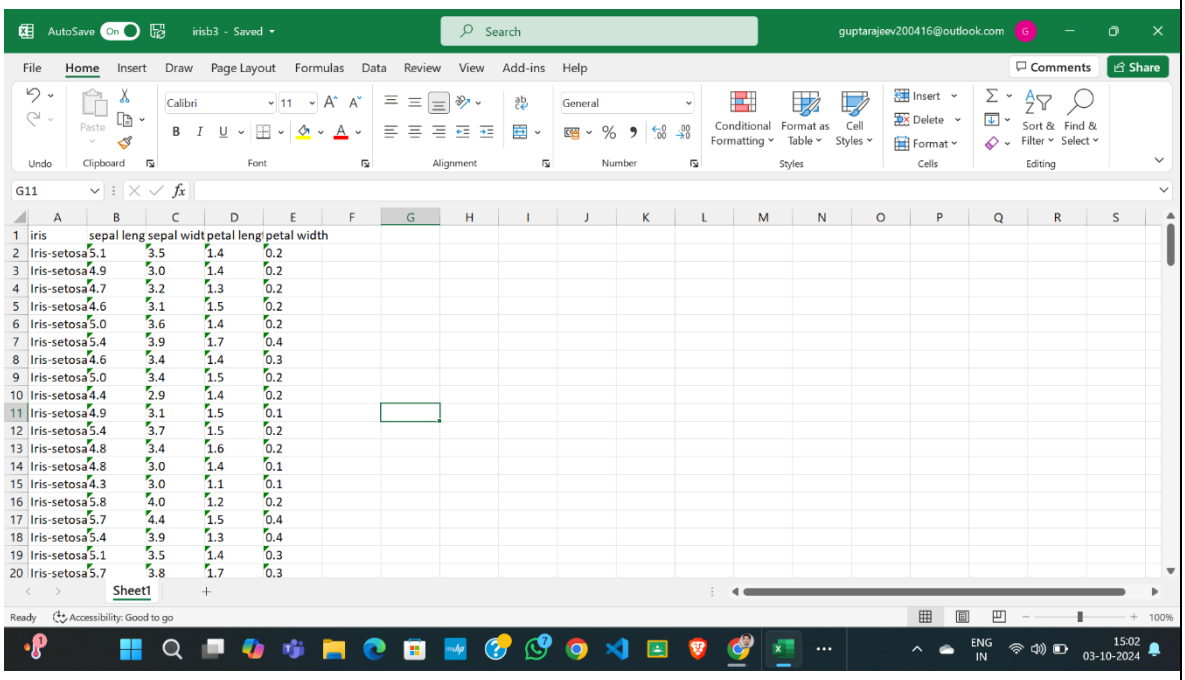


Figure 1: 1st time interaction with orange data mining tool



	A	B	C	D	E
1	iris	sepal leng	sepal widt	petal leng	petal width
2	Iris-setosa	5.1	3.5	1.4	0.2
3	Iris-setosa	4.9	3.0	1.4	0.2
4	Iris-setosa	4.7	3.2	1.3	0.2
5	Iris-setosa	4.6	3.1	1.5	0.2
6	Iris-setosa	5.0	3.6	1.4	0.2
7	Iris-setosa	5.4	3.9	1.7	0.4
8	Iris-setosa	4.6	3.4	1.4	0.3
9	Iris-setosa	5.0	3.4	1.5	0.2
10	Iris-setosa	4.4	2.9	1.4	0.2
11	Iris-setosa	4.9	3.1	1.5	0.1
12	Iris-setosa	5.4	3.7	1.5	0.2
13	Iris-setosa	4.8	3.4	1.6	0.2
14	Iris-setosa	4.8	3.0	1.4	0.1
15	Iris-setosa	4.3	3.0	1.1	0.1
16	Iris-setosa	5.8	4.0	1.2	0.2
17	Iris-setosa	5.7	4.4	1.5	0.4
18	Iris-setosa	5.4	3.9	1.3	0.4
19	Iris-setosa	5.1	3.5	1.4	0.3
20	Iris-setosa	5.7	3.8	1.7	0.3

Figure 2: Data import into the spreadsheet from the "Save Data"

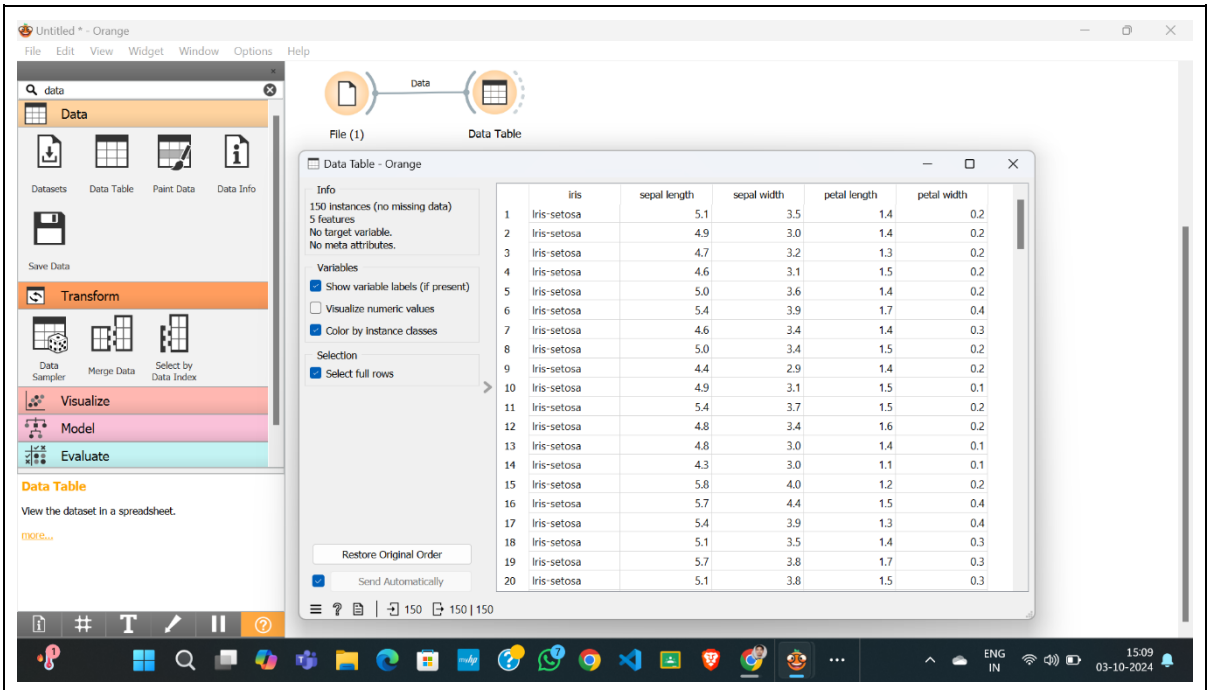


Figure 3: Explored "Data table" to see the data in the "File".

2. Data visualization:

Output screenshots here:

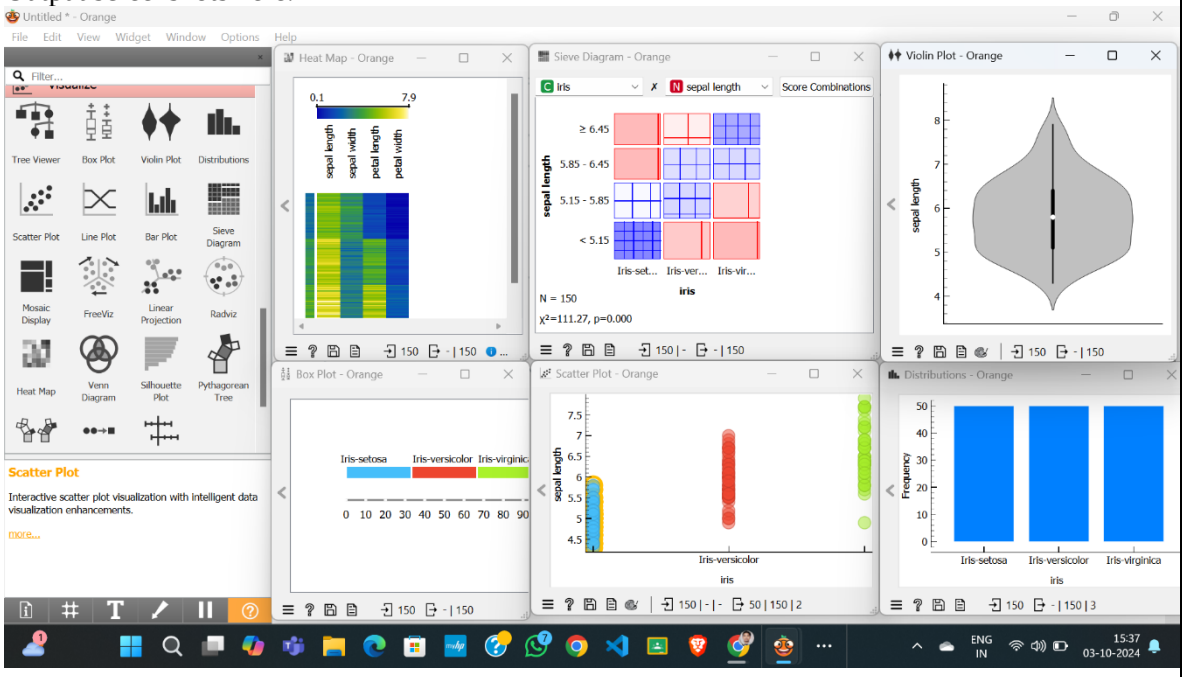


Figure 4: Explored different visualizing methods to visualize the data for better and easy understanding in effective manner.

3. Other explored functions of Orange tool:

Output screenshots here:

We get predictions from the Decision Tree, Random Forest, and Neural Network models, compared and analysed in the Predictions component about the types of flowers based on their Petal's & Sepal's Length and width.

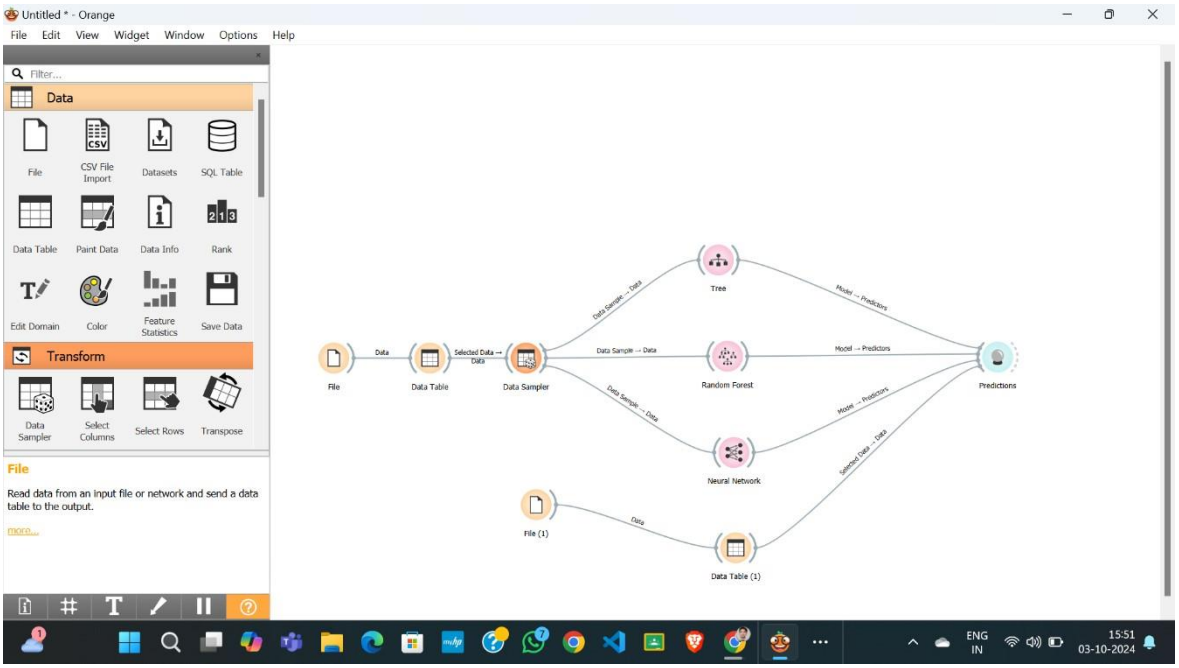


Figure 5: Machine Learning Workflow.

4. Output of explored other than Orange Data mining AI Software Tool:

Output screenshots here:

RapidMiner: It is a powerful, versatile data science platform that's great for both beginners and experienced data analysts. It's a great tool if you're looking for a comprehensive, yet accessible solution for your data mining and machine learning needs. Great for those who prefer a drag-and-drop interface. Ideal for non-coders or those new to data science.

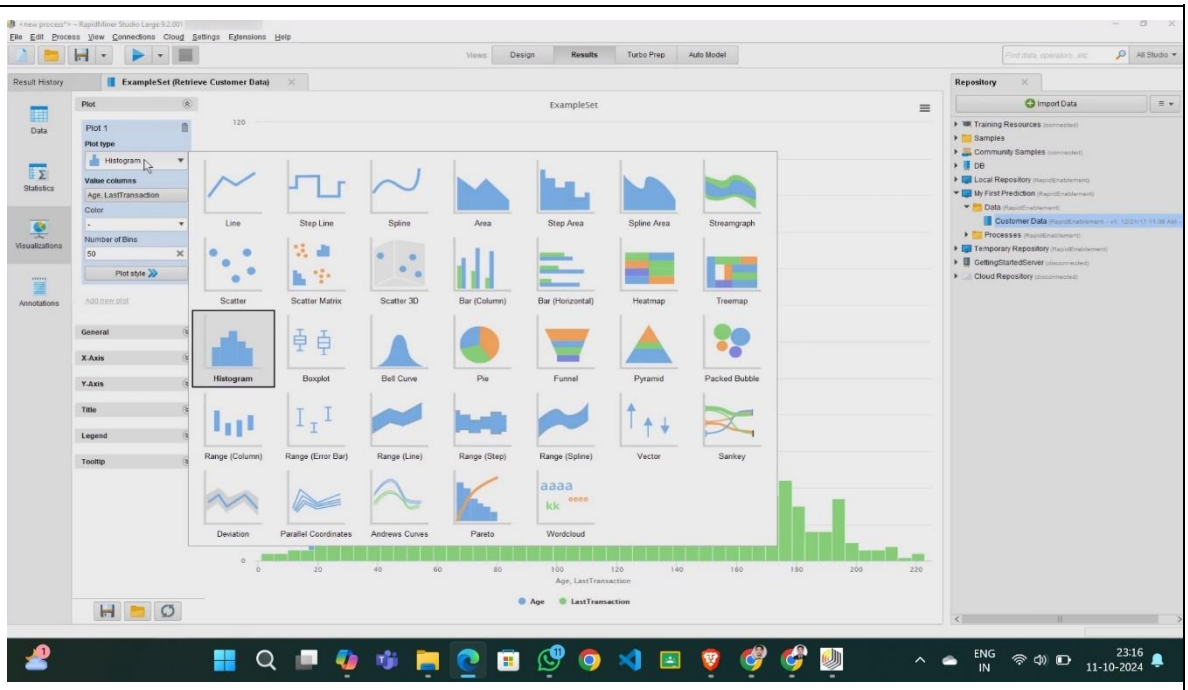


figure 6: RapidMiner Functions

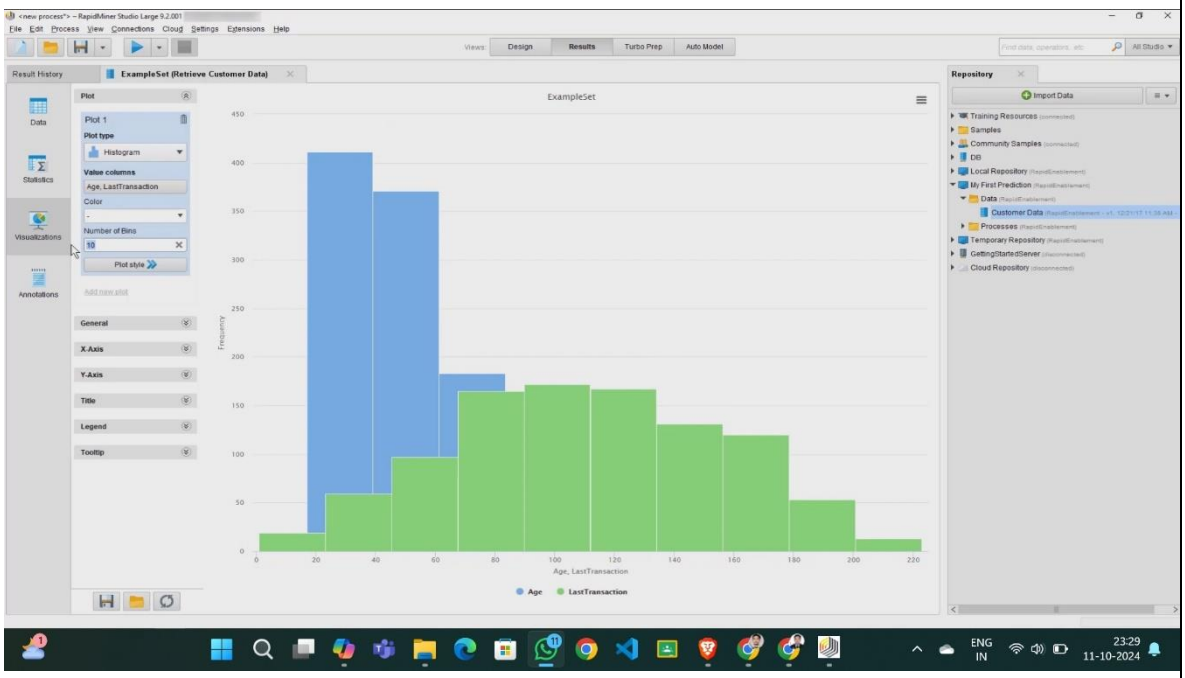


Figure 7: Visual representation in RapidMiner

Conclusion:

Overall hands-on learning experience and learning using Orange Tool

Orange data mining software is a very useful and effective tool. It supports a range of data mining techniques and machine learning algorithms, allowing us to explore data, build models and evaluate results. It is highly flexible and extensible. Orange tool provides a user-friendly yet powerful environment to extract valuable insights from our data. Perfect for those who love to tinker with data.