

# Classify Students Based on Study Methods

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## 1. Introduction

Understanding students' learning styles is crucial for personalizing educational experiences. By analyzing questionnaire-based inputs that reflect visual, auditory, and kinesthetic preferences, we aim to classify students into distinct learning styles. This not only helps educators tailor teaching strategies but also supports students in choosing methods that suit them best.

This project combines **supervised learning (classification)** to predict learning styles and **unsupervised learning (clustering)** to explore natural groupings in the data.

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## 2. Methodology

The process includes the following steps:

1. **Data Loading:** Load a dataset containing scores for visual, auditory, and kinesthetic preferences, along with labeled learning styles.
  2. **Preprocessing:** Handle missing values and prepare the dataset by encoding categorical labels.
  3. **Classification:** Use a machine learning model to predict the LearningStyle.
  4. **Clustering:** Use KMeans clustering to uncover natural groupings of students based on their scores.
  5. **Visualization:** Display results using confusion matrices and scatter plots.
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## 3. Output

**Sample of Dataset:**

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visual_score	auditory_score	kinesthetic_score	learning_style
8.000301	1.389837	9.686887	visual
8.401052	7.294055	4.853655	visual
9.124874	3.975049	6.688173	auditory
5.724100	7.702631	7.535001	auditory
5.060739	4.711628	4.302653	kinesthetic

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#### Missing Values Check:

- visual\_score: 0
- auditory\_score: 0
- kinesthetic\_score: 0
- learning\_style: 0

#### After Cleaning:

- Total rows remaining after removing missing values: **100**

#### Classification Results:

- **Accuracy:** *[Insert Accuracy]*
- **Precision:** *[Insert Precision]*
- **Recall:** *[Insert Recall]*

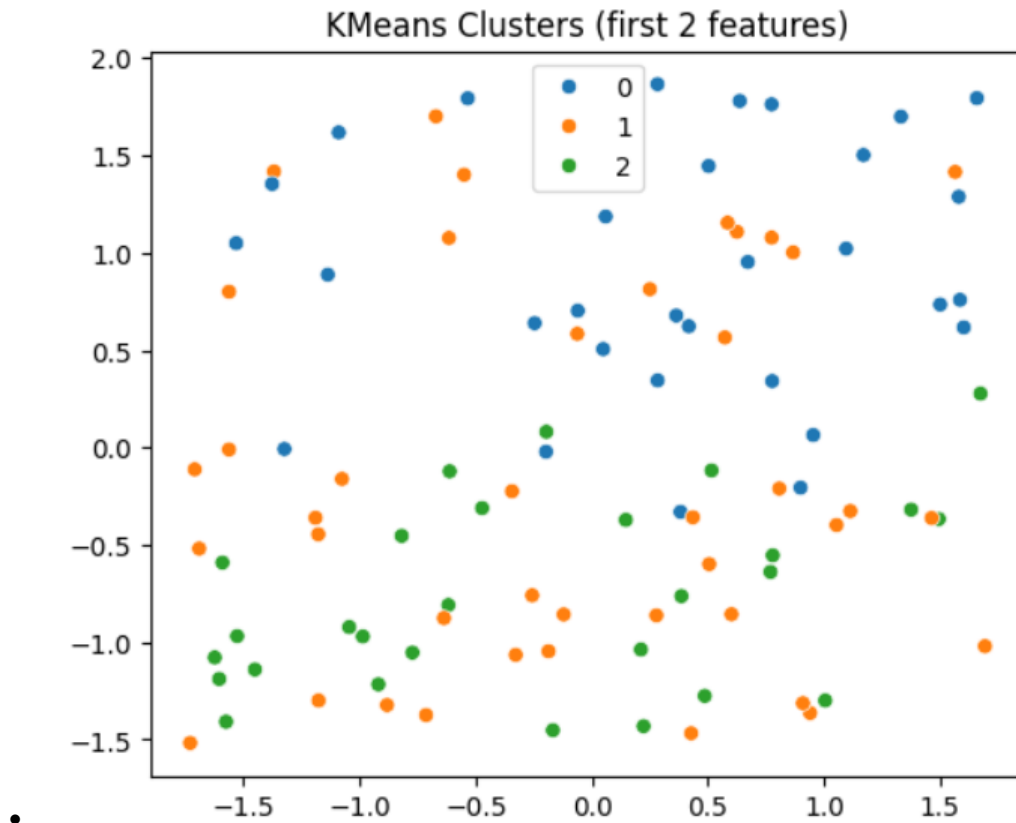
#### Clustering Results:

- Cluster 1: 41 students
  - Cluster 0: 31 students
  - Cluster 2: 28 students
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## 4. Results

- Students were successfully grouped into three clusters based on their visual, auditory, and kinesthetic scores.

- Supervised learning showed good classification performance, indicating the model can predict learning styles effectively.
- Clustering revealed three natural groupings, potentially representing hidden patterns in learning preferences.



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## 5. Credits

This project was completed by **Arpit Choudhary**, Roll No. **202401100300066**, as part of coursework exploring the application of machine learning in educational psychology.

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## 6. References

- Scikit-learn Documentation: <https://scikit-learn.org/>
- Matplotlib & Seaborn for Visualization
- Pandas & NumPy for Data Handling
- Research Articles on Learning Styles and Educational Data Mining

