

## ✓ Task 10: KNN – Handwritten Digit Classification

### Dataset:

- Primary: Sklearn Digits – load\_digits()
- Alternative: MNIST dataset

### Tools:

- Python
- Scikit-learn
- Matplotlib
- Alternatives: Weka

### Hints / Mini Guide:

1. Load digits dataset and view shapes of X and y to confirm dataset structure.
2. Visualize few digit images using matplotlib to confirm labels.
3. Split dataset into training and testing sets.
4. Apply feature scaling using StandardScaler since KNN uses distances.
5. Train KNN model with K=3 and evaluate accuracy.
6. Try multiple K values (3,5,7,9) and store results.
7. Plot accuracy vs K graph to pick best K.
8. Generate confusion matrix to check misclassified digits.
9. Display 5 test images with predicted labels to show final output.

### Deliverables:

- Notebook
- Accuracy vs K plot
- Confusion matrix

### Final Outcome:

- Intern understands distance-based classification with K tuning.

### Interview Questions Related To Above Task:

- What is K in KNN?
- Why scaling required for KNN?
- What is Euclidean distance?
- What happens if K is too low?
- What are limitations of KNN?

## 📌 Task Submission Guidelines

- ⌚ **Time Window:**

You can complete the task anytime between 10:00 AM to 10:00 PM on the given day. Submission link closes at 10:00 PM.

- 🔍 **Self-Research Allowed:**

You are free to explore, Google, or refer to tutorials to understand concepts and complete the task effectively.

- 🛠️ **Debug Yourself:**

Try to resolve all errors by yourself. This helps you learn problem-solving and ensures you don't face the same issues in future tasks.

- 💸 **No Paid Tools:**

If the task involves any paid software/tools, do not purchase anything. Just learn the process or find free alternatives.

- 📁 **GitHub Submission:**

Create a new GitHub repository for each task.

Add everything you used for the task — code, datasets, screenshots (if any), and a short README.md explaining what you did.

## ⬆️ Submit Here:

After completing the task, paste your GitHub repo link and submit it using the link below:

- 👉 [\[Submission Link\]](#)

Best  
of  
Luck

