SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE		DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
Program Name: B. Tech		**Assignment Type:** Lab	**Academic Year:** 2025-26
Course Coordinator Name	Dr.Vairachilai Shenbagavel		
Instructor(s) Name	Srinivas Komakula		
Course Code	23CA201SE402	**Course Title**	Explainable AI (P)
Year/Sem	III/V	**Regulation**	R24
Date and Day of Assignment	28-08-2025	**Time(s)**	09:00AM -05:00PM
Duration	2 Hours	**Applicable to Batch**	**23CSBTB37**
Assignment Number: 04			

Q. No.	Question	Expected Time to complete
1	**Digits (Multiclass Image Classification)**	

Objectives:

- Apply Permutation Importance to identify pixel-level contributions in digit recognition.
- Use SHAP to visualize important pixel regions globally and locally.
- Use LIME to explain why individual handwritten digits are classified correctly/incorrectly.
- Compare insights across PI, SHAP, and LIME.

Assignment Details:

- Goal: Interpret which pixels drive predictions in handwritten digit classification.
- Data: sklearn.datasets.load_digits() (64 pixel features).
- Model: RandomForestClassifier

Steps:

- Train RandomForestClassifier.
- Permutation Importance: Compute pixel importances and reshape into an 8×8 heatmap.
- SHAP: Generate beeswarm plot and a local force plot for one digit '3'.
- LIME: Produce explanations for two digits (e.g., '3' vs '8').
- Compare the three explanation methods.

Deliverables:

- Heatmap of permutation importances.
- SHAP summary + 1 local force plot.
- LIME explanations for two digits.
- Comparative analysis across methods.

Submission Requirements:

- Short methods summary (3–5 lines).
- Clean, runnable code/notebook.
- All required plots (PI, SHAP global + local, LIME local).
- 5–10 bullet insights highlighting consistencies and differences.