| 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** | **23CSBTB32** |
| **Assignment Number:** 04 | | | |

| Q. No. | Question | Expected Time to complete |
|---|---|---|
| 1 | **Assignment 2 — Breast Cancer (Binary Classification)** | |

**Objectives:**

- Use **Permutation Importance** for global feature contributions.
- Apply **SHAP** to visualize why some patients are predicted malignant/benign.
- Use **LIME** to generate local explanations for two patients.
- Compare alignment and differences between methods.

**Assignment Details:**

- **Goal:** Interpret how features influence breast cancer classification across multiple explanation techniques.
- **Data:** `sklearn.datasets.load_breast_cancer()`
- **Model:** `GradientBoostingClassifier`
- **Steps:**
  1. Train GradientBoostingClassifier.
  2. **Permutation Importance:** Rank features by prediction impact.
  3. **SHAP:** Create global summary plot and local force plots for one malignant and one benign case.
  4. **LIME:** Generate local explanations for the same two cases.
  5. Compare results across methods.
- **Deliverables:**
  - Permutation Importance plot.
  - SHAP summary + 2 force plots.
  - LIME explanations for 2 cases.
  - Comparative analysis across PI, SHAP, and LIME.

**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.