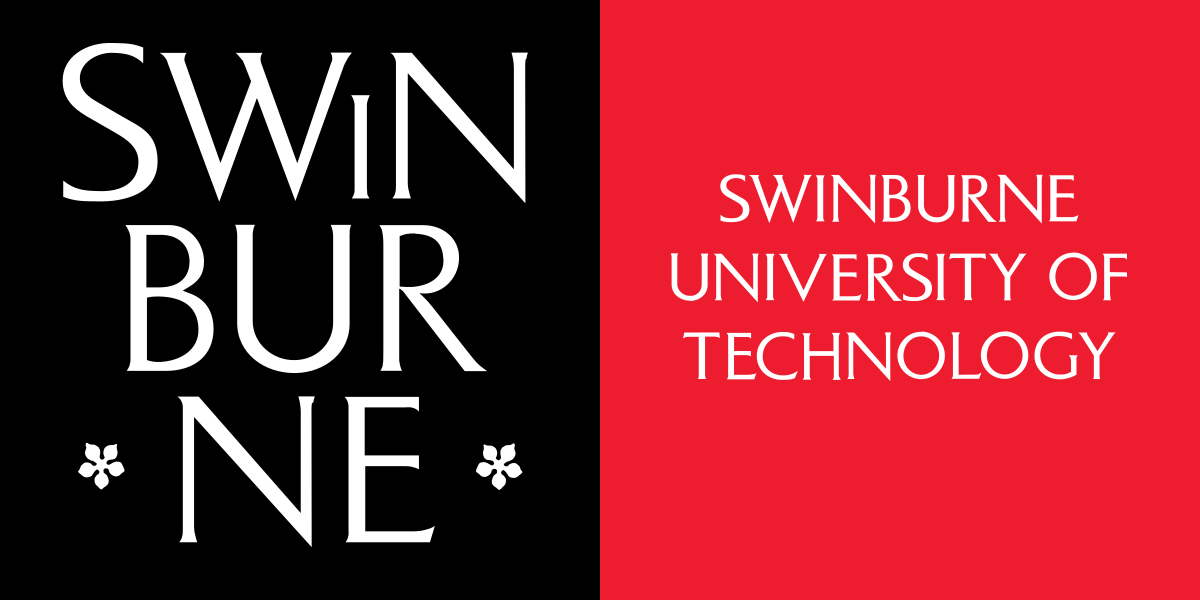
**Course Name:** Artificial Intelligence for Engineering (COS40007)

**Studio Session:** Studio 1 - 7

**Studio Tutor:** Irfan Mirza



**Title: Portfolio Assessment 2 - “Systematic Approach to Develop ML Model”**

**Name:** Ashraf Shahzad Toor

**Student ID:** 104586656

**GitHub Code Link:** <https://github.com/AshrafToor/COS40007_AIE/tree/main/Assessment2>

**Submission Date:** 30-03-2025

**Summary Table of Studio 3: Activity 6**

|  |  |
| --- | --- |
| **SVM Strategy** | **Accuracy** |
| Train-Test Split | 92.5% |
| 10-Fold CV | 86.2% |
| Hyper parameter Tuning | 92.5% |
| Top 10 Features | 87.8% |
| PCA (10 components) | 92.0% |

**Summary Table of Studio 3: Activity 7**

|  |  |
| --- | --- |
| **Model** | **Accuracy** |
| SGD Classifier | 88.4% |
| Random Forest | 91.7% |
| MLP Classifier | 92.5% |

**Step 1: Data Collection**

**Columns:**

* Frame
* Right Lower Leg (x, y, z)
* Left Lower Leg (x, y, z)
* Class (0 = Boning, 1 = Slicing)

**Step 2: Create Composite Columns**

* RMS values (xy, yz, xz, xyz)
* Roll
* Pitch

**Step 3: Data Pre-processing**

* Mean
* Standard Deviation
* Min
* Max
* Area Under Curve (AUC)
* Number of Peaks

Total features: 18 columns x 6 stats = 108 features

**Step 4: Training**

SVM, SGD, Random Forest, and MLP were trained using various strategies. The summary table is included above.

**Step 5: Model Selection**

1) SVM with hyper parameter tuning is the best model because of its accuracy (92.5%).

2) MLP Classifier outperforms all other models, handling non-linear relationships effectively in high-dimensional data.