**Walchand College of Engineering, Sangli**

## **Machine Learning Lab (6CS372)**

**TY BTech | AY 2023-2024 | Even Sem**

**Assignment 6**

**SVM and Multi-layer perceptron**

**Note**: You can use Tensorflow OR sklearn whichever suits you for this assignment. Choose one and stick to it. Links for both are given below.

<https://scikit-learn.org/stable/modules/neural_networks_supervised.html>

<https://www.tensorflow.org/guide/core/mlp_core>

1. **Study the MLP implementation and SVM implementation using API**

Refer the above links to study MLP implementation in your chosen API. Study SVM implementation in sklearn.

1. **Binary classification using SVM and MLP**
   1. Choose any dataset from <https://www.kaggle.com/datasets?tags=14201-Binary+Classification>. Choose dataset with numerical data.
   2. Perform necessary pre-processing.
   3. Train SVM and MLP model. While doing so, you have to build MLP model as follows:
      1. Define the architecture of the MLP model.
      2. Specify the number of input nodes, hidden layers, nodes in each hidden layer, and the output nodes.
      3. Choose an appropriate activation function for each layer.
      4. Compile the model with an appropriate loss function and optimizer.
      5. Train the MLP model on the training dataset.
      6. Specify the number of epochs and batch size.
      7. Monitor the training process and observe the loss curve.
   4. Evaluate the trained MLP and SVM model on the testing dataset.
   5. Calculate and report metrics such as accuracy, precision, recall, and F1-score.
   6. Visualize the confusion matrix to understand the model's performance in detail.
2. **Experimentation and Analysis:**
   1. Experiment with different architectures (e.g., varying the number of hidden layers, nodes per layer).
   2. Compare the performance of the MLP with different activation functions.
   3. Discuss the impact of hyperparameters such as learning rate, batch size, and number of epochs on the model's performance.

**Deliverables:**

Jupyter Notebook or Python script containing the implementation.

Report summarizing the findings from experimentation and analysis in notebook itself. Any additional visualizations or insights gained during the experimentation.

**Note**: Ensure proper documentation and comments throughout the code to make it understandable.