Task 1 Classification

Predict whether the student of UCU will go to heaven or hell based on his/her studying characteristics.

Task 2 Regression

The data was generated artificially to show the difference between model with and without L1 and L2 regularization. This dataset consist of 2 files - train_regression.csv and test_regression.csv. Use train_regerssion for training and validation of your models and test_regression for testing=)

General pipeline for both tasks

1. Explore data
    a. Find the hidden patterns and shapes of the data by plotting and printing it which will help to do the next step.
    b. Perform feature generation and selection
2. Train models
    a. Modify your implementations of the logistic(task 1) and linear(task 2) regressions from the previous homeworks by adding L1 and L2 regularization techniques to loss functions.
    b. Try them on the datasets
    c. Use Logistic(in task 1) and Linear(in task 2) regressions from sklearn (compare the results with your implementation).
3. Compare results
    a. Visualize results of the trained models (decision boundary in classification and fitted line in regression problem) with and without regularization and with different lambdas(in range from 0 to 150, integers only).
    b. Describe which regularization technique fits the best for each dataset and explain why it so.
4. Model selection
    a. Use different validation techniques such as holdout, K-Fold Cross-Validation and Leave-One-Out Cross-Validation (LOOCV) to choose your best model.
5. Evaluate the best models using the following metrics
    a. For classification:
        i. Classification Accuracy
        ii. Precision, recall
        iii. Confusion matrix: TP, TN, FP, FN
        iv. F1 score
        v. ROC Curves and AUC
    b. For regression:
        i. MSE
        ii. RMSE
        iii. MAE
        iv. R Squared

v. Adjusted R Squared

6. Explain what every metric tells about the performance of your classifier/regressor

Prepare the submission as two separate jupyter notebooks with all necessary code, comments and explanation. Please keep it clean and structured.