Lab 7: Model Evaluation

CPSC429/529 Machine Learning

1. **Hand written part**

   The table below shows the predictions made for a categorical target feature by a model for a test dataset. Based on this test set, calculate the evaluation measures listed below.

ID	Target	Prediction	ID	Target	Prediction	ID	Target	Prediction
1	false	false	8	true	true	15	false	false
2	false	false	9	false	false	16	false	false
3	false	false	10	false	false	17	true	false
4	false	false	11	false	false	18	true	true
5	true	true	12	true	true	19	true	true
6	false	false	13	false	false	20	true	true
7	true	true	14	true	true			

   (a) A confusion matrix (i.e., counting `TP, FN, FP, TN`). **Assumption**: treating `true` as positive.

   (b) The `precision`, `recall`, `F1 measure`, and `prediction accuracy`. Make sure to provide the formulas before your calculation.

   Submission instruction: Take a picture of your hand written answer, save it as `lab7_1.png` or `lab7_1.pdf`, upload it to D2L and hand-in the original copy to me.

2. **Programming part**

   You are given a adult dataset (`adult.data`) (https://archive.ics.uci.edu/ml/datasets/adult). The random forest model was trained and evaluated using 3-fold cross validation. You are asked to do the followings:

   (a) Calculate confusion matrix, precision, recall, f1-score, accuracy based on `y_train` and `y_train_predicted`.

   (b) Do ROC plot and calculate `auc_score` based on `y_train` and `y_train_prob`.

   (c) Do grid search on random forest model's hyperparameters. You will need to test four parameters and possible values as follows:

- 'max_depth': [80, 90, 100],
- 'max_features': [1, 2, 3],
- 'min_samples_leaf': [2, 3, 4],
- 'n_estimators': [100, 300, 1000, 1200]

You will use $cv = 3$, and fit on X_train, y_train. After running, you should print out the following information:

- best parameters
- best score

Warning: it might takes a while (**30 min - 1 hour**) to get the results back, so be patient.

The jupyter notebook skeleton of lab 7 (Lab7_2_Model_Evaluation.ipynb) is given to you, so you can complete the remaining parts (**Hints:** Refer lecture slides).

Submission instruction: Submit this jupyter notebook (Lab7_2_Model_Evaluation.ipynb) to D2L, and demo it to me (run the notebook in advance so I can see your output. DO NOT rerun the notebook while you demo your work).