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```
%Spring 2026 EELE-491
%Drew Currie Homework-2
%Problem 1
```

```
BOOSTING_RATE = 1;
UNDERSAMPLE_RATE = 0.5;
```

Question 1, part 1

```
predictions = basicLinearSVM.predictFcn(test_data);
CMat = confusionmat(test_labels, predictions);
TP = CMat(2,2);
TN = CMat(1,1);
FP = CMat(1,2);
FN = CMat(2,1);
```

```
%Calculate Accuracy, Precision, Recall, and F1
accuracy = (TP+TN)/(TP+TN+FP+FN);
precision = TP / (TP+FP);
recall = TP/(TP+FN);
F1 = 2*(precision*recall)/(precision+recall);
```

```
% Display the results
fprintf('Accuracy: %.2f%%\n', accuracy * 100);
fprintf('Precision: %.2f%%\n', precision * 100);
fprintf('Recall: %.2f%%\n', recall * 100);
fprintf('F1 Score: %.2f\n', F1);
```

```
Accuracy: 98.90%
Precision: 99.09%
Recall: 99.80%
F1 Score: 0.99
```

Part 2

```
%Create more data of minority class via boosting
minorityClass = train_data(1:100,1:2);
majorityClass = train_data(100:end, 1:2);
newData = [minorityClass; minorityClass(1:(100*BOOSTING_RATE), 1:2) +
0.01*randn(1,2)];
```

```
undersampledData = majorityClass(1:
(length(majorityClass)*UNDERSAMPLE_RATE),1:2);
newTrainingData = [newData;undersampledData];
newTrainingLabels =
[zeros(length(newData),1);ones(length(undersampledData),1)];
```

Warning: Integer operands are required for colon operator when used as index.

Part 3

```
%Create new SVM
```

Part 4

```
%Results of new Linear SVM
```

```
predictions = boostedUndersampledLinearSVM.predictFcn(test_data);
CMat = confusionmat(test_labels, predictions);
TP = CMat(2,2);
TN = CMat(1,1);
FP = CMat(1,2);
FN = CMat(2,1);
```

```
%Calculate Accuracy, Precision, Recall, and F1
```

```
accuracy = (TP+TN)/(TP+TN+FP+FN);
precision = TP / (TP+FP);
recall = TP/(TP+FN);
F1 = 2*(precision*recall)/(precision+recall);
```

```
% Display the results <- MATLAB AI added this section automatically.
% I don't know how I feel that MATLAB now has an AI always reading my code
% and making suggestions on what to write next, including trying to
% complete thsi comment for me...
fprintf('Accuracy: %.2f%%\n', accuracy * 100);
fprintf('Precision: %.2f%%\n', precision * 100);
fprintf('Recall: %.2f%%\n', recall * 100);
fprintf('F1 Score: %.2f\n', F1);
```

```
Accuracy: 97.66%
Precision: 99.52%
Recall: 98.08%
F1 Score: 0.99
```

Part 5

```
%Additional tuning: I found a boosting rate of 1, or doubling the minority
%class, and undersampling of 50% worked quite well.
% This was 200 of class 0 and 2450 of class 1.
```

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