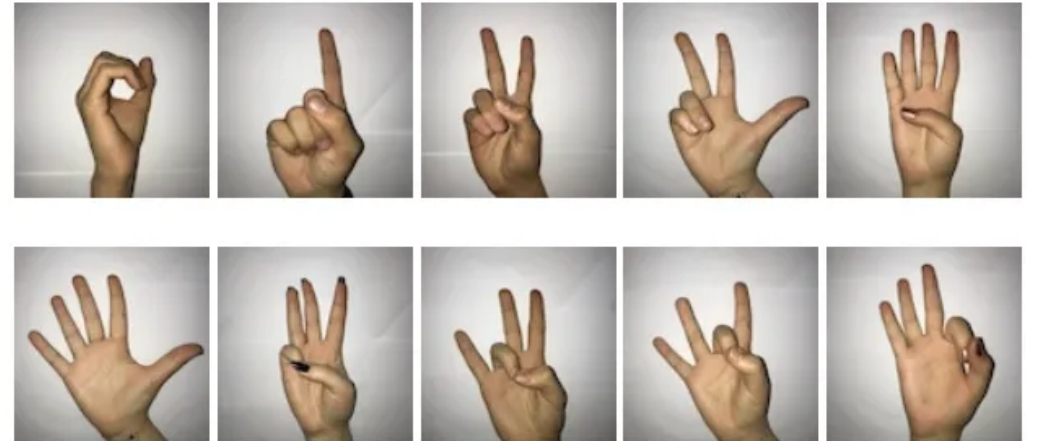


Identification of Digits from sign languages

Data

- Use of 2062 images as a database, provided by Kaggle
- Data includes all numbers from 0 to 9 with 10 labels
- Use of Raw image data due to easier manipulation



Data Preprocessing

- Changes performed randomly:
 - rotate(-20° to 20°)
 - Gaussian noise (0 to 0.05*255)
 - Gamma contrast(0.5 to 1.5)

With this changes for every image five new ones were made

Image processing

- Use of images that were grayscale and flattened showed better results
- Split the dataset into training and testing
! [bg right:40% 95%]

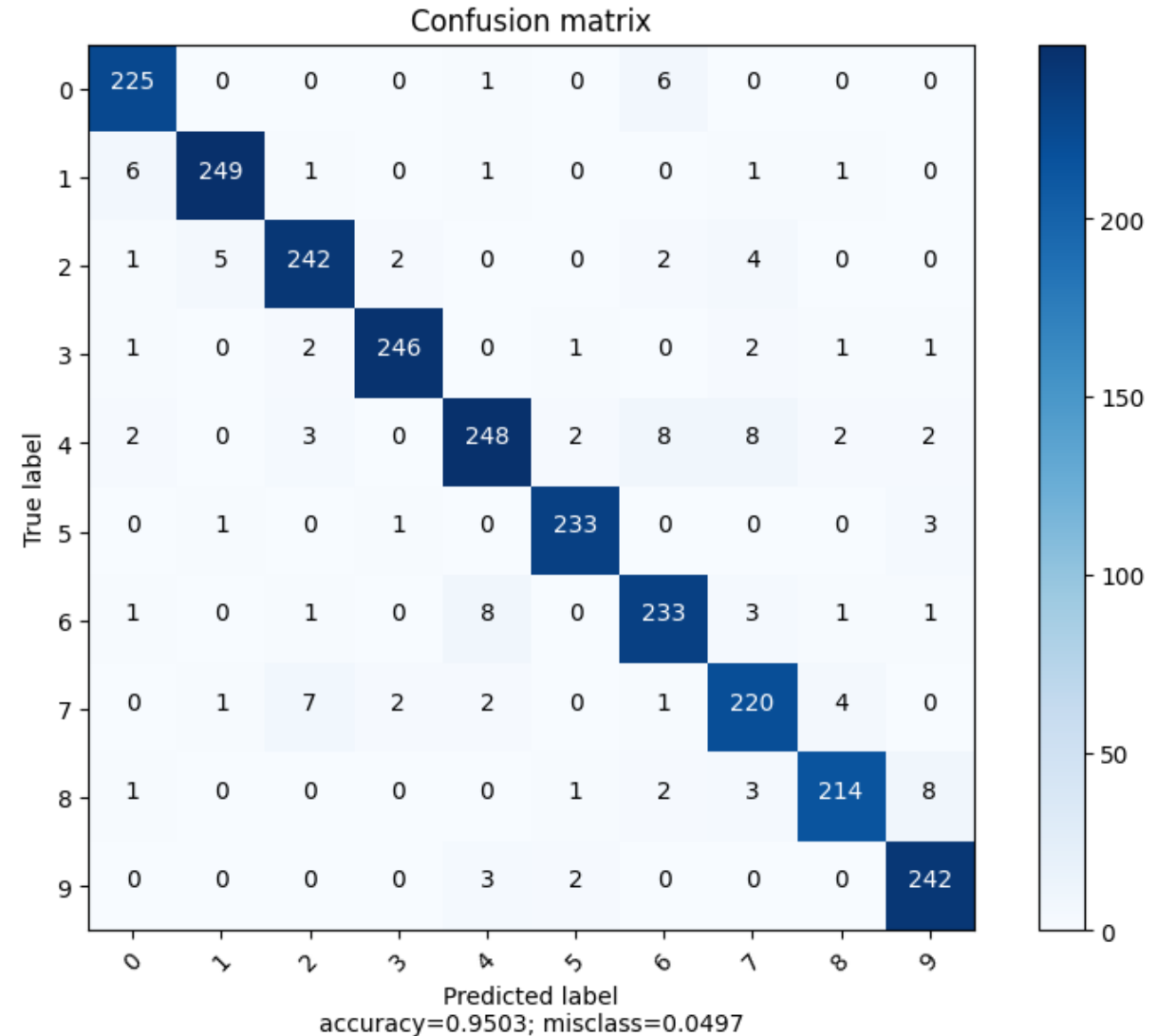
Models

model	Accuracy	F1 score
Logistic regression	0.750	0.749
Decision Tree Classifier	0.631	0.632
Random Forest Classifier	0.876	0.876
Naive Bayes	0.502	0.506
Support Vector Machines	0.888	0.888
Multilayer Perceptron classifier	0.092	0.015

hyperparameter tuning & cross-validation

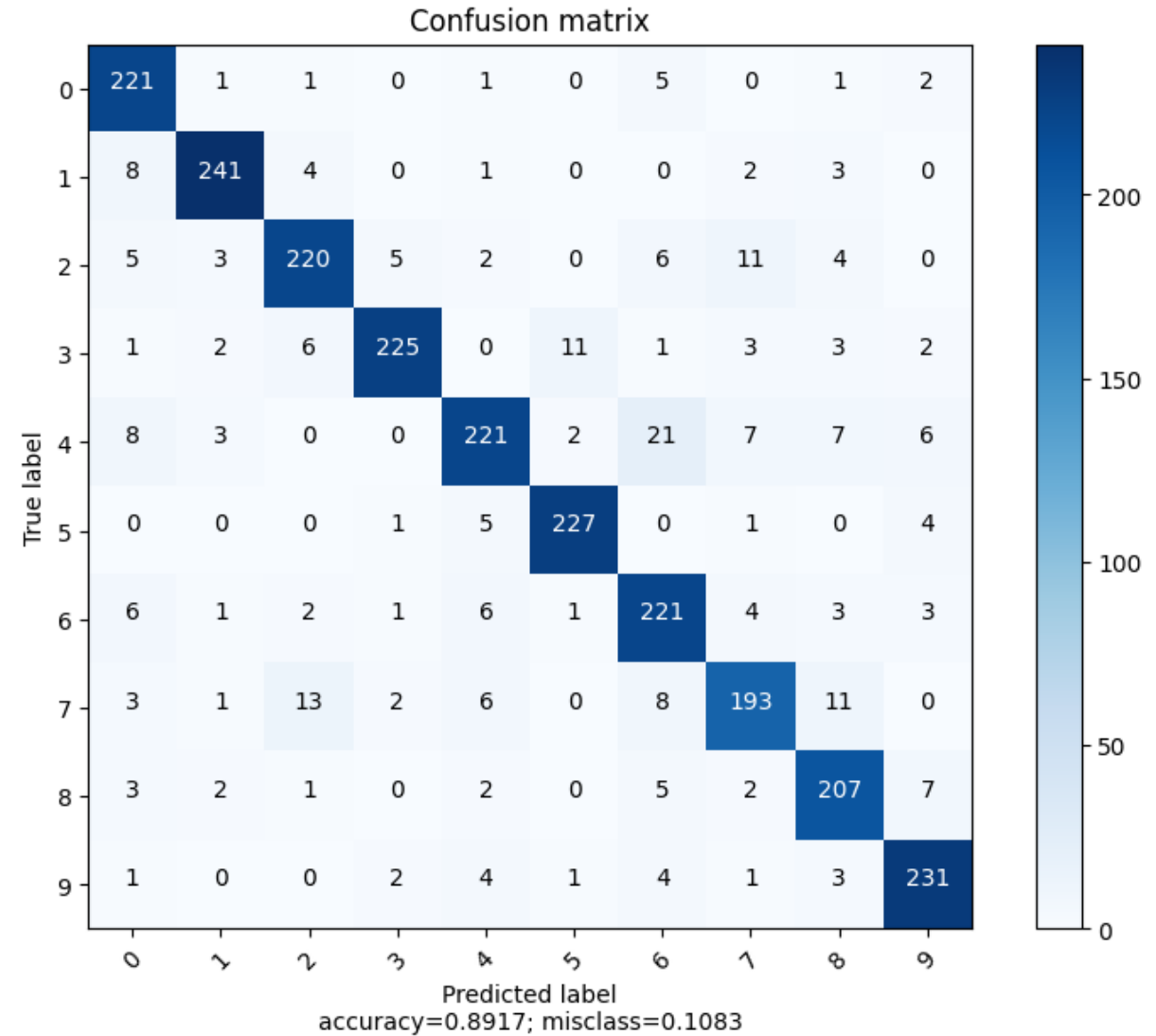
Support Vector machine

- Best performing model for the classification task.
- 88% Accuracy and F1 Score
- Best performing parameters
 - $C=100$
 - kernel=rbf
 - degree=2
 - gamma=scale



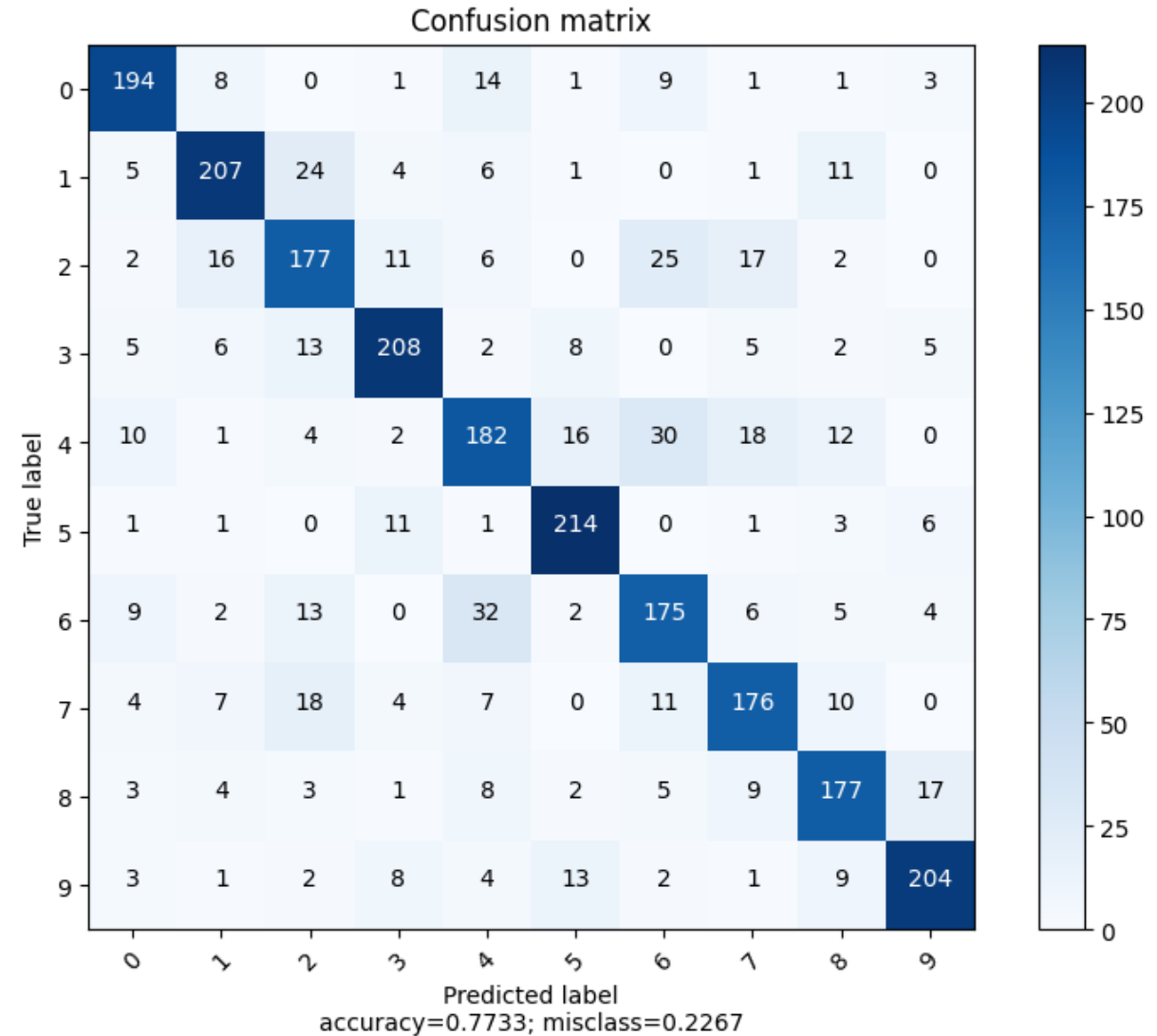
Random Forest Classifier

- Second best model
- 88% Accuracy and F1 Score
- Best performing parameters
 - `n_estimators=500`
 - `criterion=entropy`
 - `max_depth=None`
 - `min_samples_split=2`
 - `min_samples_leaf=1`
 - `max_features=auto`



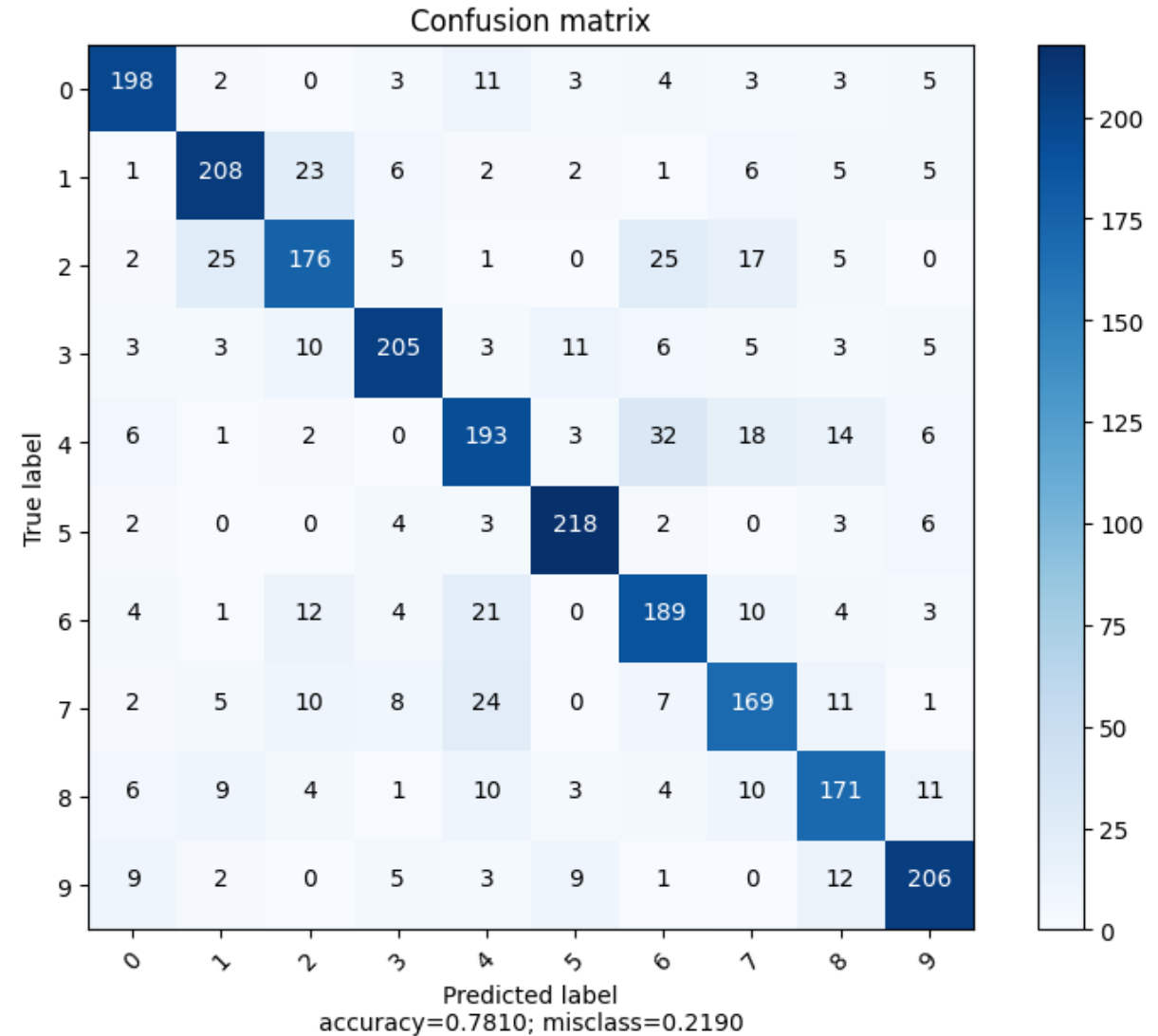
Multilayer Perceptron

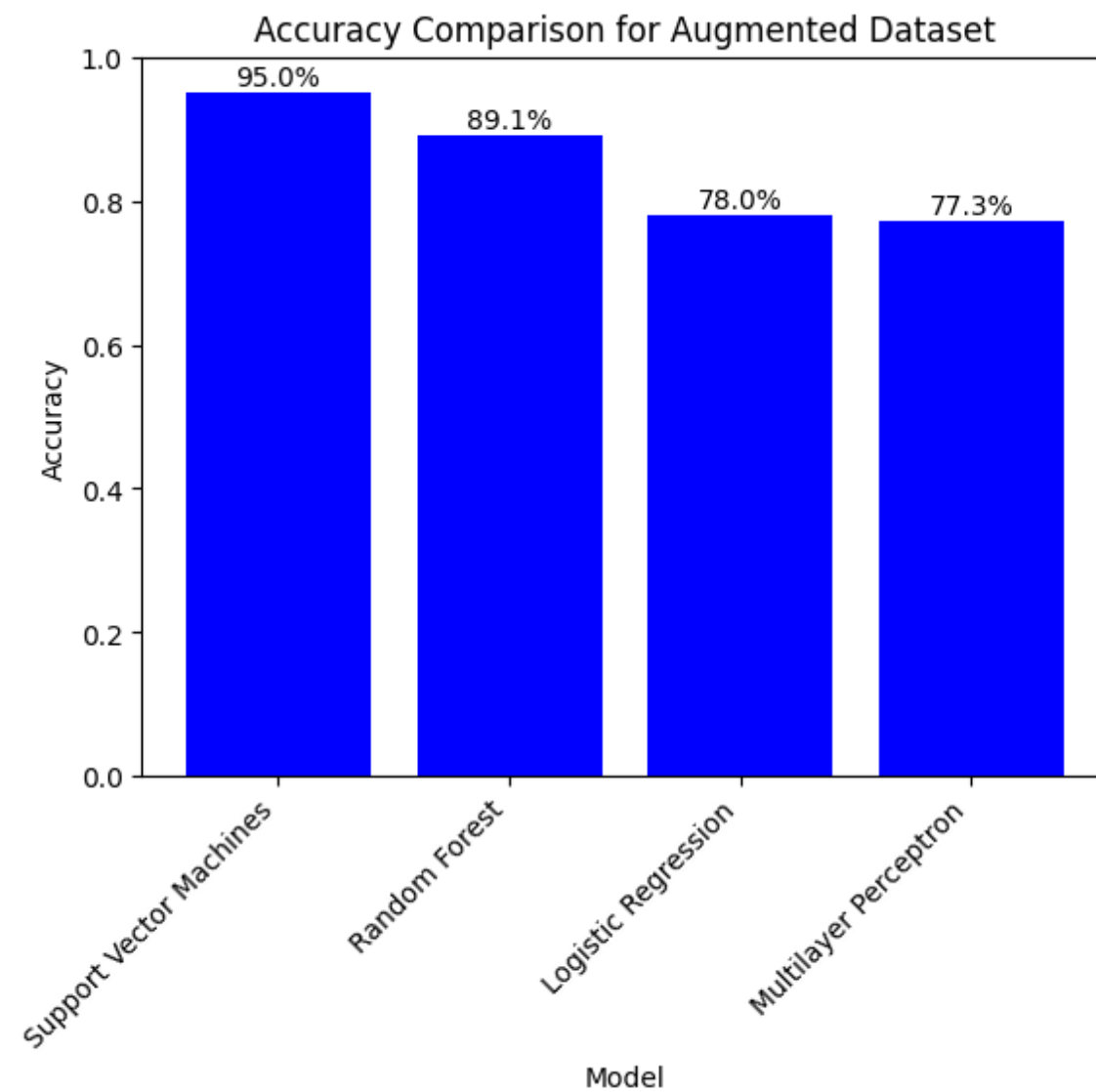
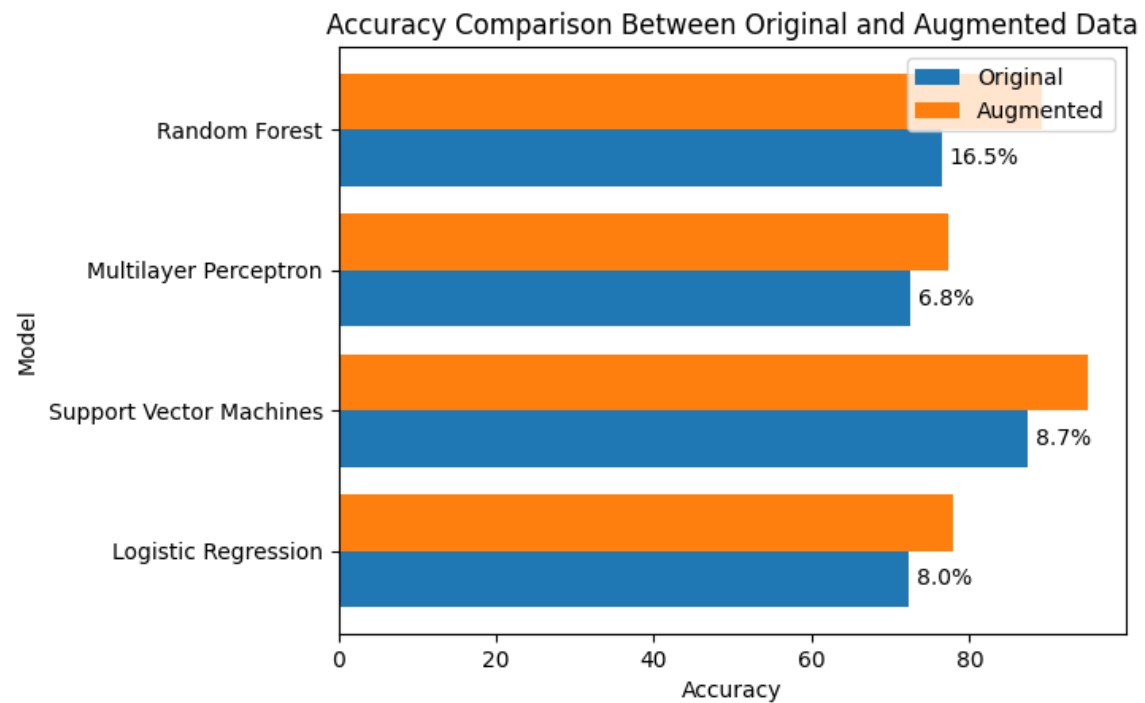
- Worst results of all tests
- 9.2% Accuracy and 1.5% F1 Score
- Best performing parameters
 - solver=lbfgs
 - max iter = 1000
 - hidden layer sizes = (256, 512, 128)
 - activation = relu
 - alpha = 0.0001
 - learning rate = adaptive
 - learning rate init = 0.001



Logistic Regression

- 75% Accuracy and 74.9% F1 Score
- Best performing parameters
 - solver
 - max iter = 1000
 - $C = 10$
 - class weight = balanced
 - penalty = l2





Conclusion

- Support Vector Machine is the best performing model for this task
- Most important aspect of these tests is the use of good data