2C - Comprehensive Comparison

1. A comparative analysis of the models and their accuracies (train and test)

Fisher Linear Discriminant: The idea proposed by Fisher is to maximize a function that will give a large separation between the projected class means, while also giving a small variance within each class, thereby minimizing the class overlap.

Linear Perceptron: It is a type of linear classifier, i.e. a classification algorithm that makes its predictions based on a linear predictor function combining a set of weights with the feature vector.

Naive Bayes: Naive Bayes classifiers are a collection of classification algorithms based on **Bayes' Theorem**. It is not a single algorithm but a family of algorithms where all of them share a common principle, i.e. every pair of features being classified is independent of each other.

Logistic Regression: Logistic Regression is a Machine Learning algorithm that is used for classification problems, it is a predictive analysis algorithm and based on the concept of probability and it uses the sigmoid function as the cost function.

Artificial Neural Networks: An **artificial neural** network (ANN) is the piece of a computing system designed to simulate the way the human brain analyzes and processes information.

Support Vector Machines: The objective of the support vector machine algorithm is to find a hyperplane in N-dimensional space(N — the number of features) that distinctly classifies the data points.

Accuracies:

Logistic Regression:
Mean accuracy for test set = 0.987077188650153
Mean accuracy for train set = 0.9871872400422944

Linear Perceptron:
Mean accuracy for test set = 0.9819633648296318
Mean accuracy for train set = 0.9831545695795543

Support Vector Machines:
Mean accuracy for test set = 0.9884519571665248
Mean accuracy for train set = 0.9886811466202106

Naive Bayes:
Mean accuracy for test set = 0.9843277151376477
Mean accuracy for train set = 0.9846485231944053

Fisher Linear Discriminant:
Mean accuracy for test set = 0.9841077022057741
Mean accuracy for train set = 0.9840986137996541

Artificial Neural Networks:
Mean accuracy for test set = 0.9880670033493375
Mean accuracy for train set = 0.9880487567840578

2. The model that performed best and one that performed worst:

The model which performed best was Support Vector Machines because it can be used to avoid the difficulties of using linear functions in the high-dimensional feature space, and the optimization problem is transformed into dual convex quadratic programs.

The model which performed worst was Linear Perceptron because it can only classify linearly separable sets of vectors.

3. The image containing box-plots for each model: