Appendix A

Table 1: Comparison of Machine Learning Models

Models	Advantages	Disadvantages
k-nearest neighbor (k-NN)	• Nonparametric • Zero cost in learning process • Intuitive approach • Robust to outliers	• Expensive computation for large datasets • Hard to interpret results • Performance depends on number of dimensions • Lack of explicit model training
Support vector machine (SVM)	• Utilizes predictive power of linear combinations • Good prediction in various situations • Low generalization error	• Weak handling of mixed data types • Sensitive to tuning parameters and kernel choice • Slow training for large datasets
Decision Trees	• Tolerance to correlated inputs • Highly interpretable (single tree) • Handles missing values • Works with numerical and categorical data	• Cannot work on combinations of features • Relatively less predictive in many situations • Prone to overfitting
Logistic regression	• Provides logistic probability model • Easy to interpret • Provides confidence interval	• Doesn't handle missing continuous variable values • Suffers multicollinearity • Sensitive to extreme continuous variable values
Naïve Bayes	• Suitable for small training sets • Easily obtain probability for prediction • Simple and straightforward to use	• Prone to bias with more training data • Assumes all features are independent and equally important • Sensitive to data preparation
Neural networks	• Generally good prediction • Tolerance to correlated inputs • Incorporates predictive power of different input combinations	• Not robust to outliers • Susceptible to irrelevant features • Difficult with big data and complex models

Table 2: Hyperparameter Grid Definition

Models	**Hyperparameter Grid**
KNN	'n_neighbors': [3,5,7], 'weights': ['uniform', 'distance'], 'metric': ['euclidean', 'manhattan', 'minkowski']
MLP	'hidden_layer_sizes': [(50,), (100,), (150,)], 'activation': ['relu', 'tanh'], 'solver':['adam'], 'learning_rate':['constant'], 'power_t':[0.5], 'alpha':[0.0001], 'max_iter':[10000], 'early_stopping':[False], 'warm_start':[False]
RF	'n_estimators': [10, 50, 100], 'max_depth': [5, 10]
CART	'max_depth': [5, 10], 'min_samples_split':[2,3]
NB	'var_smoothing' : [1e-11, 1e-10, 1e-9]
LDA	'solver': ["svd","lsqr"]
QDA	'reg_param':[0.1,0.2,0.3,0.4,0.5]
LR	'C': [0.001, 0.01, 0.1, 1.0]
Aboost	'n_estimators': [50, 100, 200], 'learning_rate': [0.01, 0.1, 1.0]