- [ ] Datasets

 - [ ] Select two datasets

 - [ ] Preprocess datasets

 - [ ] Choose a performance metric (accuracy, error, precision or recall) for each dataset and justify choice

 - [ ] Introduce each dataset and write why they are interesting, and brief description of the preprocessing

- [ ] Talk about overall experimental methodology

- [ ] Decision Trees (DT)

 - [ ] Learning Curve plot and analysis

 - [ ] Keep the optimal hyperparameter choice . Vary the training data set size , train models with data and plot the curves

 - [ ] bias and variance / overfit and underfit analysis

 - [ ] Validation curves for at least two hyperparameters

 - [ ] Pruning is a required hyperparameter

 - [ ] Vary hyperparameter of interest keeping all other optimal hyperparameters fixed and train the models and plot the curves

 - [ ] bias and variance / overfit and underfit analysis

 - [ ] Add intermidate learning or validation curve to show suboptimal performance and analysis

 - [ ] Link back results to some algorithmic behavior, hyperparameter interaction between the algorithm and input data, etc

 - [ ] Document wall clock times

 - [ ] Tune model to be optimal (GridSearch allowed)

 - [ ] Analyze results isolated to other algoritms

 - [ ] Compare and contrast results across algorithms and across datasets

- [ ] Neural Networks (NN)

 - [ ] Learning Curve plot and analysis

 - [ ] X axis should be iterations or epoch - ie loss curve

 - [ ] Keep the optimal hyperparameter choice . Vary the training data set size , train models with data and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Validation curves for at least two hyperparameters

 - [ ] Hidden Layer Size is a required hyperparameter

 - [ ] Vary hyperparameter of interest keeping all other optimal hyperparameters fixed and train the models and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Add intermidate learning or validation curve to show suboptimal performance and analysis

 - [ ] Link back results to some algorithmic behavior, hyperparameter interaction between the algorithm and input data, etc

 - [ ] Document wall clock times

 - [ ] Tune model to be optimal (GridSearch allowed)

 - [ ] Analyze results isolated to other algoritms

 - [ ] Compare and contrast results across algorithms and across datasets

- [ ] Boosting

 - [ ] Learning Curve plot and analysis

 - [ ] Keep the optimal hyperparameter choice . Vary the training data set size , train models with data and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Validation curves for at least two hyperparameters

 - [ ] \# of Weak Learners is a required hyperparameter

 - [ ] Vary hyperparameter of interest keeping all other optimal hyperparameters fixed and train the models and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Add intermidate learning or validation curve to show suboptimal performance and analysis

 - [ ] Link back results to some algorithmic behavior, hyperparameter interaction between the algorithm and input data, etc

 - [ ] Document wall clock times

 - [ ] Tune model to be optimal (GridSearch allowed)

 - [ ] Analyze results isolated to other algoritms

 - [ ] Compare and contrast results across algorithms and across datasets

- [ ] Support vector machines (SVM)

 - [ ] Learning Curve plot and analysis

 - [ ] Keep the optimal hyperparameter choice . Vary the training data set size , train models with data and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Validation curves for at least two hyperparameters

 - [ ] Kernel Type is a required hyperparameter

 - [ ] Vary hyperparameter of interest keeping all other optimal hyperparameters fixed and train the models and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Add intermidate learning or validation curve to show suboptimal performance and analysis

 - [ ] Link back results to some algorithmic behavior, hyperparameter interaction between the algorithm and input data, etc

 - [ ] Document wall clock times

 - [ ] Tune model to be optimal (GridSearch allowed)

 - [ ] Analyze results isolated to other algoritms

 - [ ] Compare and contrast results across algorithms and across datasets

- [ ] K-Nearest Neighbor (kNN)

 - [ ] Learning Curve plot and analysis

 - [ ] Keep the optimal hyperparameter choice . Vary the training data set size , train models with data and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Validation curves for at least two hyperparameters

 - [ ] K is a required hyperparameter

 - [ ] Vary hyperparameter of interest keeping all other optimal hyperparameters fixed and train the models and plot the curves

 - [ ] Bias and variance / overfit and underfit analysis

 - [ ] Add intermidate learning or validation curve to show suboptimal performance and analysis

 - [ ] Link back results to some algorithmic behavior, hyperparameter interaction between the algorithm and input data, etc

 - [ ] Document wall clock times

 - [ ] Tune model to be optimal (GridSearch allowed)

 - [ ] Analyze results isolated to other algoritms

 - [ ] Compare and contrast results across algorithms and across datasets

- [ ] Write solid conclusion