

# [Statistical learning – hastie and tibshirani](https://assignbuster.com/statistical-learning-hastie-tibshirani/)

Statistical LearningModel: Y= f(X) + epsilonWhat can a good f do- Predict   
- Help understand which variables are relevant   
- How each feature X\_i affects target Y ONSTATISTICAL LEARNING – HASTIE & TIBSHIRANI SPECIFICALLY FOR YOUFOR ONLY$13. 90/PAGEOrder NowRegression Function- Ideal function: one that minimizes some loss func, e. g. MSE   
- Turns out to be f(x) = E(Y| X) or average   
- optimizes MSE (mean squared error)Nearest Nbr AveragingTo account for x without any observations, we can relax f(x) = E(Y| X) to f(x) = E[Y| X in N(x)] where N denoted neighborhoodCurse of dimenisnalityReducible vs Irreducible ErrorE[(Y - f''(X))^2| X= x] = [f''(x) - f(x)]^2 + Var(epsilon)Model Tradeoffs- Prediction accuracy vs interpretability   
- under-fit vs over-fit   
- Simple Model vs Black BoxBias vs Variance tradeoffE[y\_0 - f '(x\_0)]^2 = bias(f ') + var(f ') + var(epsilon)Classification ProblemModel classifier C(x) to predict class for x where class is in {1, 2, ... , L} - i. e. L classesconditional class probabilitiesp\_i(x) = Pr(Y= i | X = x), i = 1, 2, ... , LBayes Optimal ClassifierC(x) = argmax\_{i in 1, 2, ..., L} p\_i(x)KNN (K-nearest neighbors)EquippedMisclassification errorErr\_{Test} = mean\_{i in Test} I[y\_i neq C '(x\_i)]