**Professor Baron’s Statistical Machine Learning Lectures**

**Fall-2020:**

[**08-24-2020**](https://youtu.be/K2OKEglRXs4)

Introduction and syllabus. Main concepts of statistical machine learning. Training and testing data.

[**08-27-2020**](https://youtu.be/SNFu3KJpEIQ)

Main concepts of machine learning continued. Training and testing data. Flexible and non-flexible methods. Overfitting and underfitting. Example: splines.

[**08-31-2020**](https://youtu.be/DUzhXtqlGBo)

Performance evaluation. Training an testing data. Mean squared error. Regression review. Partial F-test and the extra sum of squares.

[**09-03-2020**](https://youtu.be/eaGrAGG4Q4w)

Regression review continued. ANOVA, partial F-tests, lack-of-fit tests, dummy variables, interactions.

[**09-10-2020**](https://youtu.be/_U3fbEC2bvM)

Classification algorithms and their performance evaluation. KNN method.

[**09-14-2020**](https://youtu.be/heSRlIlwse4)

Classiication. KNN review. Logistic regression. Example: depression diagnostics.

[**09-17-2020**](https://youtu.be/-b90LjdTpaU)

Classification. Logistic regression. Sorry, there are only 37 minutes of the video, however, you can see all our class notes from Zoom in the "Our class notes on Classification" file.

[**09-21-2020**](https://youtu.be/4n1856tfkDk)

Linear discriminant analysis (LDA).

[**09-24-2020**](https://youtu.be/ZlPH8YW6UWQ)

Linear discriminant analysis. Cross-validation.

[**09-28-2020**](https://youtu.be/e4n-zkZMCRk)

Quadratic discriminant analysis (QDA). Classification machine learning, comparison of KNN, logistic regression, LDA, QDA.

Cross-validation techniques. Validation set method, Leave-one-out cross-validation.

[**10-01-2020**](https://youtu.be/h8IuNXO5mGY)

Cross-validation: LOOCV, K-fold. CV in classification problems. Jackknife method for bias reduction.

[**10-05-2020**](https://youtu.be/bS8Ok0eRe9Q)

Jackknife examples. R package "bootstrap". Bootstrap.

[**10-08-2020**](https://youtu.be/pWqn1rYg-gE)

Bootstrap.

[**10-12-2020**](https://youtu.be/DutoQQv8vJk)

Dimension reduction and variable selection.

[**10-15-2020**](https://youtu.be/E2NIZvsDlM4)

Variable selection. Ridge regression and shrinkage.

[**10-19-2020**](https://youtu.be/LucZgKoRae8)

Ridge regression and LASSO.

[**10-22-2020**](https://youtu.be/UXYQ0Kkeok8)

Ridge regression and LASSO - Bayesian methods. Intro to principal components.

[**10-26-2020**](https://youtu.be/2QvTxp3GZgg)

Discussion of the Midterm Test. Principal Components.

[**10-29-2020**](https://youtu.be/r47rmPCRFjw)

PCR and PLS. Principal components regression and partial least squares

[**11-02-2020**](https://youtu.be/WL7dWG0B3gE)

Splines.

[**11-05-2020**](https://youtu.be/GZQag4QzCu0)

Smoothing splines. Trees.

[**11-09-2020**](https://youtu.be/JHTKf-JbgGg)

Trees, bagging, and random forests.

[**11-12-2020**](https://youtu.be/5pVjxECL2VU)

Trees, bagging, and random forests, their implementation in R, and optimal tuning.

[**11-16-2020**](https://youtu.be/DUjWovYACCA)

Maximal margin classified and Support vector machines.

[**11-19-2020**](https://youtu.be/0o7tz8u3ofE)

Support Vector Machines. Review, examples, and tuning in R.

Introduction to Clustering.

[**11-23-2020**](https://youtu.be/QTm7349ZBTU)

Clustering.

[**11-30-2020**](https://youtu.be/Jt14cVM7lqg)

Intro to artificial neural networks.

[**12-03-2020**](https://youtu.be/LwdnJ-CVt7A)

Final project presentations:

- Finance: prediction for the next day market

- Professional basketball: how to distinguish between two identical twins

- Prediction of bike rentals

VIDEO LECTURES by AUTHORS:

<https://www.dataschool.io/15-hours-of-expert-machine-learning-videos/>