

Machine Learning

Kubrick's Machine Learning training syllabus is aimed to provide a thorough foundation of machine learning concepts.

Part 1 – Statistical Learning

1. Introduction to Basic Concepts

- Machine Learning
- Supervised vs Unsupervised vs Reinforcement
- Classification vs Regression
- Challenges in Machine Learning
- Guided end to end walkthrough

2. Statistical Learning

- Spaces
- Machine Learning Assumptions
- Loss Functions
- Risk Functional, Constrained Risk Functional and their Empirical Counterparts
- Excess Risk
- Approximation Error vs Estimation Error
- Bias vs Variance
- Underfitting vs Overfitting

Part 2 – Machine Learning Models

1. Linear Regression

- Intuition, Functional Form, Objective Function

2. Gradient Descent and Optimization

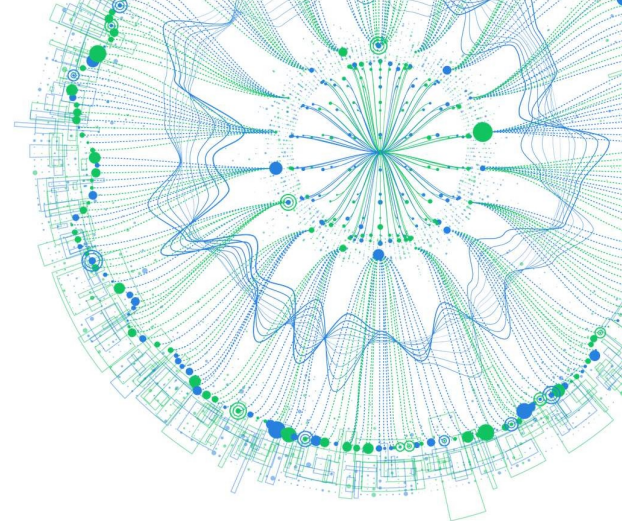
- Convex Functions
- Gradient Descent Algorithm
- Stopping Criteria
- Minibatch / Stochastic Variations

3. Logistic Regression

- Intuition, Functional Form, Objective Function
- Log loss and Maximum Likelihood Estimation

4. Feature Engineering

- Intuition / Polynomial / Basis Function Models



5. Feature Selection

- Linear Feature Importance Measures
- Feature Selection Algorithms

6. Model Evaluation

- Training, Validation and Test Sets
- K-Fold Cross Validation
- Sampling Methods

7. Evaluation Metrics

- Regression Metrics
- Classification Metrics

8. Regularization and Penalty Methods

- Introduction to Regularization
- Ridge Regression
- Lasso Regression

9. Support Vector Classifiers *

- Intuition, Functional Form, Objective Function

10. Multiclass Classification

- Multinomial Logistic Regression
- One-Vs-All

11. K-Nearest Neighbours

- Intuition, Functional Form, Objective Function

12. Classification and Regression Trees

- Intuition, Functional Form, Objective Function and Optimization

13. Ensemble Methods

- Model Averaging, Bagged Trees and Random Forests
- Gradient Boosting *

14. Model Diagnostics

- Diagnosing overfitting and underfitting
- Learning Curves

15. Model Interpretability *

- SHAP
- LIME

