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PRML

Lecture (1,2,3)
Week 1.

→ Course overview
→ Intro to PRML
→ Regression: Technique of curve fitting
→ Clustering: Unsupervised discovery of structure
→ Classification: Supervised discovery of structure
→ Dimension Reductionality: Removing Reductant Dims
→ Time series: Modeleing into temporal structure
→ Bayesian Model: Model based bayes theorem of Conditional probability

Regression

→ Curve fitting task.
→ for Continous value labels
→ univariate $y = f(x)$ x is variable
Multivariate $y = f(x_1 \dots x_n)$ $x_1, \dots x_n$ are variable
→ Linear : $y = mx + c$ or $y = wx + b$
Non-linear $y = w_1 x^2 + w_2 x + b$

→ Cost function
→ Gradient Desent for optimization
types :- Gradient Descent (Batch-size = dataset)
: batch GD
: Socastic GD (Batch size = 1)

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Clustering

→ Grouping of similar data
→ Partioning approach : K-means, fuzzy-C
→ Gaussian mix model
→ Hierarchical - agglomerative
→ Hierarchical divisive
  bottom up
  Top down

Classification

Classification is clustering on basis of labels
→ Generative v/s discriminative
→ Binary v/s multiclass
→ Parametric v/s non-parametric
→ Logistic regression
→ K-nearest Neighbour
→ SVM's
→ Generative classifiers.

PR's borrow heavily from statistics prob and random processes and signal processing

ML uses theories developed in PR to develop efficient algo

PR may be treated as theory of ML

DL involves task of learning features & also Pattern

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Terminology

1) PR :- Hand crafted ~~Patterns~~ feature + Predifined model

ML : Hand crafted feature + Comp. learning Pattern

DL: learning features ~~and~~ + learning pattern

Intelligence: Ability to learn something and use it for deciding future coarse

AI: task like
Discovery, learning, dealing with uncertainity and new situation.

AI 1.0 : Rules and Problem with list of formal and mathematical aspect

→ Chess Game
→ Not Successful for several recognition task

AI 2.0
Speech recognition and Computer vision
AI 1.0 → Hand crafted feature to raw data in AI 20

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ML

Goal

y: dependent variable
x: independent variable

$$y = f(x)$$

Goal of ML is to find most accurate mapping form $x \rightarrow y$

OR

Goal is discover a pattern recognizer.

Thats why PR is treated as theory of ML.