# یادگیری ماشین

## (Clustering)

محمد دهقانی



## آنچه در این جلسه یاد خواهیم گرفت:

۱. بررسی Clustering

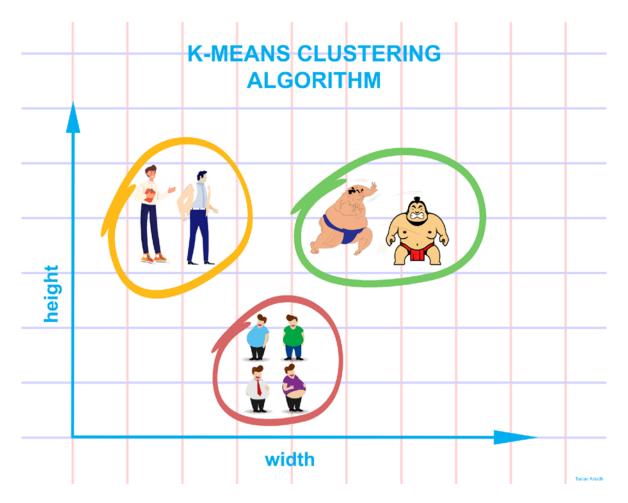
۲. بررسی کاربردهای مختلف خوشه بندی

۳. پیاده سازی

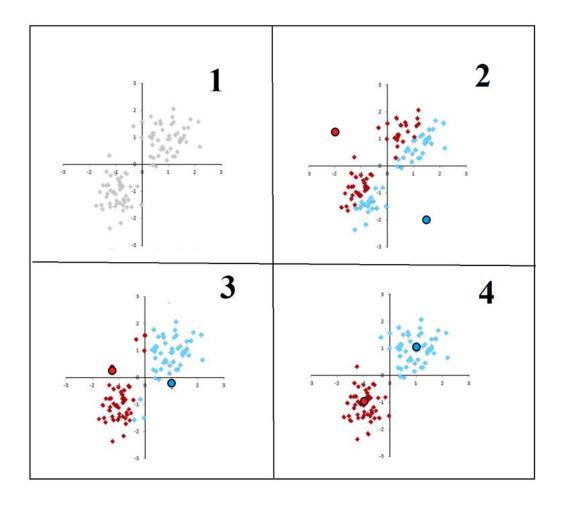
#### MACHINE LEARNING SUPERVISED UNSUPERVISED LEARNING **LEARNING** CLASSIFICATION REGRESSION CLUSTERING Support Vector Machines K-Means, K-Medoids Fuzzy C-Means Linear Regression, GLM Discriminant SVR, GPR Hierarchical Analysis Naive Bayes Ensemble Methods Gaussian Mixture Hidden Markov Model Nearest Neighbor **Decision Trees** Neural Networks Neural Networks Neural Networks

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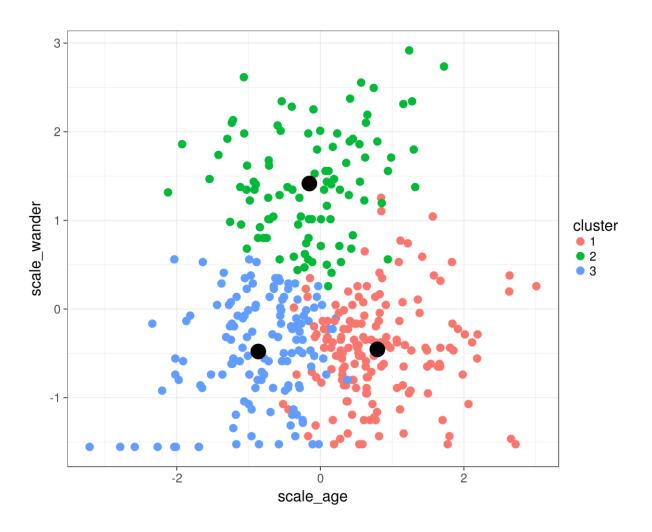
### Clustering



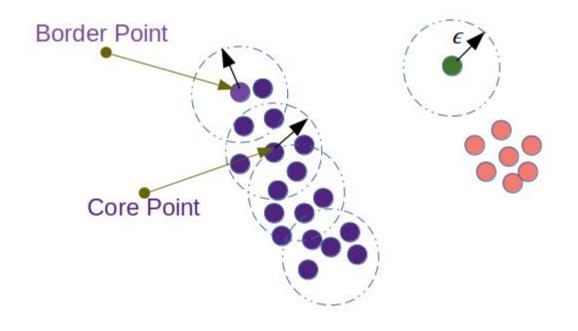
### K-Means



#### K-Means



#### **DBSCAN**



$$N_{Eps}(p) = \{ q \in D \text{ such that } dist(p,q) \le \epsilon \}$$

$$\epsilon = 1$$
 unit, MinPts = 7

# DBSEMN

DBSCAN looks for densely packed observations and makes no assumptions about the number or shape of clusters.

- 1. A random observation, xi, is selected
- 2. If x; has a minimum of close neighbors, we consider it part of a cluster.
- 3. Step 2 is repeated recursively for all of x,'s neighbors, then heighbors' neighbors etc... These are the cluster's core members.
- 4. Once Step 3 runs out of observations, a new random point is chosen

Afterwards, observations not part of a core are assigned to a nearby cluster or marked as outliers.

ChrisAlbon

#### **DBSCAN**

**DBSCAN** k-means

#### #DONTFORGETUS

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