

Advanced Robotic Perception: Lecture 5

Lecture Notes

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1 Training

2 Basic performance metrics

- TP = true positive etc.
- Recognition rate = $TP / \text{number of tested samples}$
- etc.

Confusion matrix: a matrix which displays the outputs relative to the outputs. You can derive different metrics from the data in the confusion matrix, and put them into the adjacent columns.

ROC curve (Receiver Operating Characteristic). Plot FP ratios and TP ratios against each other.

3 Classic machine learning methods

Self supervised learning, is predicting based on the data produced by its own predictions.

K-means clustering There may exist K clusters in the data. For every point, compute the distance to each cluster center, and assign it to the closest cluster. Disadvantages: If a cluster is confined within another cluster, then it would categorise them all as one cluster.

DBSCAN Can find arbitrarily shaped clusters, as long as there is a uniform density in the clusters. It uses the distance to neighbours to determine if a data point is within the cluster, and then it works kinda like grass fire algorithm.

3.1 Supervised learning

Bias is errors from assumptions model that makes bad predictions about the data.

3.1.1 Support Vector Machines

Based on hyperplanes, there is a margin around a vector, which can be used to divide two classes.

In this case you could manually introduce a dimension to make it easier to classify. It is easy to do when the dataset is very small.