

Emerging Methods for Early Detection of Forest Fires

Prior Knowledge

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Supervised learning:

In supervised Learning, the machine learns under supervision. It contains a model that is able to predict with the help of a labelled dataset. A labelled dataset is one where you already know the target answer. In this case, we have images that are labelled a spoon or a knife

Supervised machine learning requires labelled input and output data during the training phase of the machine learning life cycle. This training data is often labelled by a data scientist in the preparation phase, before being used to train and test the model. Once the model has learned the relationship between the input and output data, it can be used to classify new and unseen datasets and predict outcomes.

This known data is fed to the machine, which analyses and learns the association of these images based on its features such as shape, size, sharpness, etc. Now when a new image is fed to the machine without any label, the machine is able to predict accurately that it is a spoon with the help of the past data.

The reason it is called supervised machine learning is because at least part of this approach requires human oversight. The vast majority of available data is unlabeled, raw data. Human interaction is generally required to accurately label data ready for supervised learning. Naturally, this can be a resource intensive process, as large arrays of accurately labelled training data are needed.

Real-Life Application of Supervised Learning:

- Text Categorization.
- Face Detection.
- Signature recognition.

- Spam detection in both mails and calls.
- Weather forecasting.

Unsupervised Learning:

In unsupervised learning, the machine uses unlabeled data and learns on itself without any supervision. The machine tries to find a pattern in the unlabeled data and gives a response. Let's take a similar example as before, but this time we do not tell the machine whether it's a spoon or a knife. The machine identifies patterns from the given set and groups them based on their patterns, similarities etc.

Unsupervised machine learning is the training of models on raw and unlabeled training data. It is often used to identify patterns and trends in raw datasets, or to cluster similar data into a specific number of groups. It's also often an approach used in the early exploratory phase to better understand the datasets.

Unsupervised machine learning is mainly used to:

Cluster datasets on similarities between features or segment data
Understand relationship between different data points such as automated music recommendations
Perform initial data analysis

The main differences of supervised vs unsupervised learning include:

The need for labelled data in supervised machine learning. The problem the model is deployed to solve. Supervised machine learning is generally used to classify data or make predictions, whereas unsupervised learning is generally used to understand relationships within datasets. Supervised machine learning is much more resource-intensive because of the need for labelled data. In unsupervised machine learning it can be more difficult to reach the adequate levels of explainability because of less human oversight.

Real-Life Application of Unsupervised Learning:

- Data Exploration.
- Customer Segmentation.
- Recommendation systems.
- Target marketing campaigns and
- Data preparation and visualization.