Chapter 5
Landmark Recognition Using Ensemble-Based Machine Learning Models

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ABSTRACT

Recognizing landmarks in images with machine learning is an excellent topic for research today. Landmark recognition is an important field in computer vision. In this field, we train the machine learning models to identify and recognize the closed distinctly distinguishable objects in a digital image. In general, if we consider a digital image to be a set of coordinates of different pixels, a landmark is said to be enclosed in that closed polygon formed by the pixels that may be considered as a distinct and distinguishable thing in one or the other sense. Landmark recognition is an important subject area of image classification since it is considered as one of the first steps towards reaching complete computer vision. The extremely broad definition of a landmark makes it eligible to be considered as one of the leading problems in image classification tasks. Since the task is considered to be a very broad one, the solutions to the task hold no easy procedures. This chapter explores landmark recognition using ensemble-based machine learning models.

INTRODUCTION

Recognizing landmarks in images with machine learning is an excellent topic for research today. Landmark recognition is an important field in computer vision (Noh, 2017). In this field, we train the machine learning models to identify and recognize the closed distinctly distinguishable objects in a digital image. In general, if we consider a digital image to be a set of coordinates of different pixels, a landmark is

said to be enclosed in that closed polygon formed by the pixels that may be considered as a distinct and distinguishable thing in one or the other sense (Magliani et al., 2019).

Landmark Recognition is an important subject area of image classification since it is considered as one of the first steps towards reaching complete computer vision (Zheng, 2009). The extremely broad definition of a landmark makes it eligible to be considered as one of the leading problems in image classification tasks (Chen et al., 2014). Since the task is considered to be a very broad one, the solutions to the task hold no easy procedures.

Today, many Machine Learning techniques have been developed to handle the process of image classification (Weyand, 2020). However, landmark recognition remains a difficult task due to its broadness. The datasets available for landmark recognition continue to grow exponentially and with the increase in sizes of datasets, the accuracies tend to fall. But with the continuous efforts of people working in Artificial Intelligence (AI), accuracies, too, have seen a considerable jump (Chen, 2011).

Figure 1. An overview of machine learning models
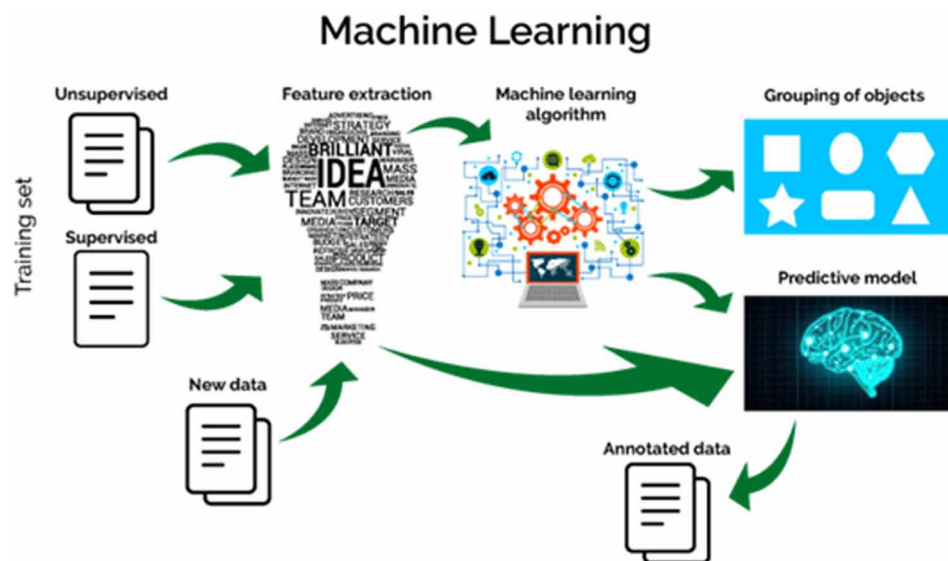
MACHINE LEARNING AND ITS TECHNIQUES

Machine Learning can be defined as the field of Artificial Intelligence (AI) that deals with training machines to determine patterns in the data that is fed to it and based on the patterns that the machine determines, making acceptable decisions on the new data which may be used to further carry out different other tasks. Machine learning (ML) algorithms are mostly thought to work well only on very crisp and clean data. Moreover, the lesser the data needed for generalization, the better is an ML model expected to work (Jordan & Mitchell, 2015).

Machine Learning models are trained on various types of data. Based on the type of data, ML techniques are classified into the following categories:

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