Abstract

Representing unlabelled visual data in the form of an ontology data poses a challenging problem, with existing methods first requiring the source image data to be labelled by either human annotators or by a model which relies on data labelled in accordance with a human developed taxonomy. The Ence ontology and Ogma framework are presented as a solution to this problem, the development of which are detailed in this dissertation. The Ogma framework uses a combination of existing, state-of-the-art methods and original methods to extract colours, shapes and segments from and to cluster (for the purpose of label assignment) a set of unstructured, still images in an unsupervised manner. The extracted data is then used to generate a knowledge graph from the Ence ontology. The Ence ontology facilitates images to be searched by colour, shape and similarity to other images. This dissertation outlines the design, implementation, supporting software tools, evaluation, and potential for future work of the Ogma framework and the Ence ontology. The work presented in this dissertation draws on research from the following fields: metaheuristics, unsupervised learning, genetic algorithms, ontological engineering, computer vision, machine learning, deep learning, and artificial intelligence.