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Masterarbeit

Exploring Feature Combination Strategies in Convolutional Neural Networks for Enhanced Image Classification

Abstract

This thesis aims to investigate the impact of combining specific types of features in Convolutional Neural Networks (CNNs) on the decision-making process for image classification tasks.
The study will focus on understanding how different types of features, such as edges, lines, and curves, contribute to the overall performance of a CNN and how their combination can be optimized to improve the accuracy of image classification.

The research will be structured into several key areas:

1. Literature Review: A comprehensive review of existing literature on CNNs, focusing on studies that have explored feature combination strategies. This will provide a theoretical foundation for the research and identify gaps in the current knowledge.
2. Feature Extraction and Combination: An in-depth exploration of different types of features extracted by CNNs and how they can be combined. This will involve experimenting with various feature combination strategies and evaluating their impact on the performance of the CNN.
3. Model Development and Evaluation: Development of a CNN model that incorporates the optimal feature combination strategy identified in the previous stage. The model's performance will be evaluated using a variety of image classification tasks and compared with standard CNN models.
4. Case Study Applications: Application of the developed model to real-world image classification tasks. This could include tasks such as object recognition, facial recognition, or medical image analysis.
5. Future Directions: Identification of potential future research directions, including how the findings of this study could be applied to other types of neural networks or other machine learning tasks.

The outcome of this research could provide valuable insights into the workings of CNNs and contribute to the development of more accurate and efficient image classification models.

The work can be done in German or English.

Prior knowledge

- Basic understanding of machine learning in general and CNN in particular
- Programming skills (Python)
- Strong interest in and enthusiasm for research

Research area

- Machine Learning
- Convolutional Neural Networks (CNNs)
- Computer Vision & Image Processing

Studiengang

- [x] Elektro- und Informationstechnik
- [x] Informatik
- [x] Mathematik
- [x] Physik

Alignment

- [x] Research
- [x] Implementation
- [x] Analysis and evaluation
- [x] Method development

Start

At any time

Links

Mitarbeiterseite

Ansprechpartner

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