Introduction

Object identification, the foundation of computer vision, is still a vibrant and active area of study. Even though a lot has been accomplished thanks to the creation of high-precision models like Mask R-CNN and Faster R-CNN, the search for ever more accurately tailored solutions continues. This objective is the focal point of our work, which focuses on thoroughly evaluating cutting-edge detection techniques.

Our comprehensive study includes traditional CNN-based detection methods as well as more recent approaches such as DETR, CoTr, and CenterMask. The benchmarking technique comprises a thorough assessment of well-known datasets using measurements such as mean Average Precision (mAP), speed, and memory utilization to acquire precise insights into algorithm performance. Furthermore, our evaluation takes into account the algorithms' resistance to changes in dataset size and dispersion. In addition, we compare the algorithms in terms of overall accuracy, speed, and memory efficiency. We compare the algorithm outputs to a baseline model and calculate the difference in accuracy, speed, and memory economy. Similarly, we compare multiple algorithms to find which one performs the best. Finally, we report our findings in detail.

We intend to identify the detection technique—or combination of techniques—that provides the highest levels of precision, computational effectiveness, and robustness through this detailed examination. Such optimization is required to meet the stringent criteria of real-world applications in a variety of fields.

Findings from our research have the potential to improve object detecting algorithms. By identifying which algorithmic substrates are most matched to present computer vision applications, we want to provide fresh insights that will guide the further development of even more optimal object identification capabilities. Our goal is to encourage additional research in this area and provide practitioners with the knowledge they need to select the best algorithms for their specific needs.