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Review: Tiny Face Detection and Recognition Techniques

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ABSTRACT

The exponential growth of video and image databases has created a need for intelligent systems to automatically analyze information, as manual efforts are no longer feasible. Faces plays a crucial role in social interaction, conveying identity and emotions, thus requiring efficient and accurate analysis. Deep learning techniques has brought about a significant revolution in face detection, despite their increased computational requirements.

This paper presents a comprehensive analysis of representative deep learning-based methods for face detection, focusing on their accuracy and efficiency. It also compares and discusses popular and challenging datasets, including their evaluation metrics. Additionally, a thorough comparison of successful deep learning-based face detectors is conducted, evaluating their efficiency using Floating Point Operations (FLOPs) and latency as metrics.

The results and findings of this study can serve as a valuable guide for selecting suitable face detectors for various applications. Moreover, they can contribute to the development of more efficient and accurate detectors. The paper aims to address the pressing needs for intelligent systems that can automatically understand and analyze visual information in an increasingly data-driven world.

Key words; Deep learning based face detection, Facial expression recognition, Neural Network Architectures

1. INTRODUCTION

Face detection poses a significant challenge in the field of object recognition, particularly when it comes to detecting small objects. In this context of face detection, we delve into three crucial aspects: scale invariance, image resolution, and contextual reasoning. Scale invariance is a fundamental property in recognition and object detection systems, enabling robust detection across different scales[6]. The exponential growth of video and image databases has made it increasingly burdensome for humans to manually process and analyze the vast amount of visual data available. Faces hold paramount importance in social interactions, serving as a means to convey identity and emotions. To address the demanding task of automatically comprehending and examining visual information, deep learning technique has emerged a powerful solution, exhibiting remarkable breakthroughs in face detection. However, these advancements come at the cost of heightened computational requirements[8].

This paper aims to provide a comprehensive exploration of deep learning-based methods for face detection, with a specific focus on their accuracy and efficiency. The goal is to shed light on the advancements in this field, analyzing various techniques and their performance. Additionally, the paper highlights the need to strike balance between accuracy and computational efficiency on face detection systems.

Figure 1 showcases examples of successful face detection, demonstrating the capabilities of the discussed methods[13].