VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

A CG&IP-LAB MINI PROJECT REPORT ON

Object Detection Using MobileNetSSD

IN

COMPUTER SCIENCE AND DESIGN

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CERTIFICATE

This is to certify that the CG&IP-LAB Mini Project entitled "Object Detection Using MobileNetSSD " has been successfully completed by

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the bonafide students of Department of Computer Science & Design, Alva's Institute of Engineering and Technology in **DEPARTMENT OF COMPUTER SCIENCE & DESIGN** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY,BELAGAVI** during the year 2024–2025. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The Mini project report has been approved as it satisfies the academic requirements in respect of Mini Project work prescribed for the Bachelor of Engineering Degree.

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ABSRACT

Object detection is a pivotal task in computer vision, involving the identification and localization of objects within images. This paper presents an in-depth analysis of the MobileNet Single Shot MultiBox Detector (MobileNetSSD), a cutting-edge framework designed for efficient and real-time object detection on resource-constrained devices like mobile phones and embedded systems.

MobileNetSSD leverages the MobileNet architecture, which employs depthwise separable convolutions to significantly reduce computational complexity and model size while maintaining high accuracy. The MobileNet architecture, combined with the Single Shot MultiBox Detector (SSD) framework, allows for both high-speed and accurate object detection. This paper provides a detailed exploration of MobileNetSSD's architecture, highlighting key components such as depthwise separable convolutions, which are instrumental in achieving a lightweight model suitable for real-time applications. We also discuss the training process, including data augmentation techniques and optimization strategies that enhance the model's performance.

Experimental results on standard object detection benchmarks, such as the PASCAL VOC and COCO datasets, demonstrate that MobileNetSSD achieves a commendable balance between detection speed and accuracy. The model's performance is evaluated in terms of mean Average Precision (mAP), inference time, and resource consumption, showcasing its potential for deployment in real-world scenarios.

Furthermore, the paper explores various applications of MobileNetSSD, including autonomous driving, surveillance systems, and augmented reality, where real-time processing and low latency are crucial. We also discuss potential improvements and future directions for enhancing MobileNetSSD's capabilities.

In conclusion, MobileNetSSD represents a significant advancement in the field of object detection, offering a practical solution for deploying efficient and accurate detection models on mobile and embedded devices.