A Project Report

On

**OBJECT DETECTION**

**Submitted by**

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Date of Submission



**DECLARATION**

We ANURAG KUMAR , BTECH CSE FIRST YEAR (2315000383), SHIVAM KUMAR , BTECH CSE FIRST YEAR (2315002068), NAMAN YADAV , BTECH CSE FIRST YEAR (2315001425), SHUBHI GUPTA , BTECH CSE FIRST YEAR (2315002149) , SHAGUN NAYAK , BTECH CSE FIRST YEAR (2315002022), SARTHAK AWASTHI , BTECH CSE FIRST YEAR (2315001988). hereby declare that the work presented in this project report entitled object detection is an authentic record of our own work carried out under supervision of PIYUSH VASHISTHA (assistant professor CEA).

**Anurag Kumar – 2315000383 Shivam Kumar– 2315002068**

**Naman Yadav – 2315001425 Shubhi Gupta – 2315002149**

**Shagun Nayak – 2315002022 Sarthak Awasthi - 2315001988**

**CERTIFICATE**

This is to certify that the above statement made by the students are correct to the best of my knowledge and belief.

Date: 14 DEC, 2023

Place: Mathura

Name and Signature with Affiliation of Supervisor

**Contents**

|  |  |  |
| --- | --- | --- |
| Certificate & Declaration | |  |
|  |
| Table of Contents | |  |
| 1. **Introduction, Motivation and Objective** | |  |
| 1. **Project Description and Work done** | |  |
| 1. **Geotagged Images of Students at the place of work** | |  |
| 1. **Conclusion** | |  |
| Bibliography/ References | |  |



**Chapter - 1**

**Introduction, Motivation and Objective**

**WHAT IS OBJECT DETECTION?**

**Object detection projects leverage computer vision techniques to identify and locate objects within images or videos.**

**The process typically begins with the collection and annotation of a diverse dataset, where bounding boxes are marked around objects of interest, and labels are assigned. Following data preprocessing, a suitable object detection model, like Faster R-CNN, YOLO, or SSD, is selected**

**OBJECTIVE**

**The primary objective of an object detection project is to use computer vision to identify, locate, and classify objects within images or videos. The goals vary based on the application, ranging from enhancing security and surveillance to improving efficiency in areas such as autonomous vehicles,**

**retail, healthcare, and smart cities. The project aims to leverage advanced technology to solve specific challenges and contribute to real-world applications in diverse domains**

**APPLICATIONS :**

* **Object detection can be used to identify and track people on public transportation, helping to prevent crime and ensure passenger safety.**
* **Medical imaging: Identifying abnormalities in X-rays, CT scans, and other medical images**
* **Self-driving cars: Detecting objects on the road like cars, pedestrians, and traffic sign**

**YOLOv8 for Object Detection**

**What is YOLO (You Only Look Once)?**

**YOLO (You Only Look Once) is a popular set of object detection models used for real-time** [**object detection**](https://en.wikipedia.org/wiki/Object_detection) **and classification in computer vision**

**YOLO, "You Only Look Once," detects objects in images. It divides the image into grids, where each cell predicts bounding boxes & confidence scores. It then predicts class probabilities for each box. Finally, it removes redundant boxes and refines predictions for accuracy. This single-stage approach makes YOLO fast & efficient.**



**Chapter - 2**

**Description and Work done**

**🧩Implementation**

**The culmination of my exploration led me to a structured chronology of steps, facilitating a comprehensive understanding and implementation**

* + **Python Basics: Understanding the fundamentals of Python, covering essential concepts such as loops (for and while), functions, input handling, error management, and conditional**

**statements (if-else).**

* + **Familiarization with External Libraries: Grasping the workings of external libraries and their integration within Python for enhanced functionality.**
  + **Environment Setup: Installing Python, emphasizing a stable version (e.g., Python 3.11 instead of 3.12), and PyCharm's community edition for an efficient coding environment.**
  + **Repository Initialization: Installing necessary requirements from the GitHub repository, including essential images pertinent to the project.**
  + **Implementing YOLO: Employing YOLO for the beta version of object detection. I have provided the image detection code on GitHub with detailed explanations to ensure ease of understanding.**

**🧩Object detection using live webcams and videos, building upon the foundation laid during the initial phase. Here's the structured approach:**

* + **Building upon YOLO Basics: Revisiting the foundational understanding of YOLO to advance into real-time object detection.**
  + **Data Collection and Object Catalog: Gathering and installing various videos from our GitHub repository alongside a comprehensive list of objects in our surroundings essential for our detection system.**
  + **Code Enhancement and Professionalization: Providing an improved, refined version of code that facilitates real-time object detection through webcams and videos.**



**Chapter - 3**

**Geotagged Images of Students at the place of work**

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**Chapter – 4**

**Findings and Conclusion**

* **Accuracy vs. Speed Trade-off: Achieving high accuracy while maintaining real-time performance remains a challenge. Faster models often sacrifice accuracy, while more accurate models tend to be slower.**
* **Small Object Detection: Detecting small or occluded objects within an image is challenging for many models and requires further improvement.**
* **Object detection projects contribute to solving real-world challenges and have a broad impact across industries, with ongoing opportunities for innovation and improvement.**



**Bibliography/ References**

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