CAHIERS MAGELLANES-NS
Volume 06 Issue 1
2024

ISSN:1624-1940
DOI 10.6084/m9.figshare.26090926
http://magellanes.com/

OBJECT DETECTION [YOLO]

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ABSTRACT

In today's hectic and stressful lifestyle, the frequent issue of losing items can be highly inconvenient. Until the Internet of Things (IoT) becomes a ubiquitous part of our daily lives, software can serve as an efficient tool to aid in the search, verification, and recovery of Misplaced things. The paper introduces an program based on android that we have both proposed and Executed to assist users in locating misplaced things. By using this program, subscribers can record their requests with the relevant authorities. Moreover, a dedicated section allows users to input a phone number or electronic mail for communication among finder and loser of item. Through testing, the platform demonstrated its capabilities, including user registration and logging, providing extensive information on misplaced things, and by default sending misplaced-and-discovered notifications. This paper is intended to be beneficial for individuals involved in the application of information technology. Over the years, the issue of handling lost and found items has been a persistent challenge for various institutions and establishments, including airports, train stations, educational campuses, shopping centres, and event venues. The conventional approach to this predicament has heavily leaned on manual efforts, requiring meticulous cataloguing of discovered items, detailed description recording, and the reliance on owners eventually reclaiming their possessions. Regrettably, this procedure has frequently been marked by inefficiencies, mistakes, and a deficiency in real-time communication.

Keywords: Object Detection , App Development , YOLO, IOT , Coordinate Axis , ML.

1. Introduction:

[1] At times, we tend to overlook past events, and some individuals might experience theft, making the retrieval of our belongings challenging. Losing valuable items such as significant files, Credentials, smartphones, tablets, laptops, wallets, keys, Baggage, or jewellery can lead to Pressure and Disruption. [3] The level of distress tends to escalate with the significance of the lost item in a person's daily life. Opting for traditional procedures after losing assets, especially valuable ones, like completing an formal form at the court or visiting lost & discovered department, may not be sufficient to ensure the Recuperation of lost things.

[9]The Real-time object detection has become pivotal across many software, Encompassing various domains like Self-governing vehicles, robotics, Visual monitoring, & Enhanced reality. Between the array of object detection Procedure, YOLO (You Only Look Once)

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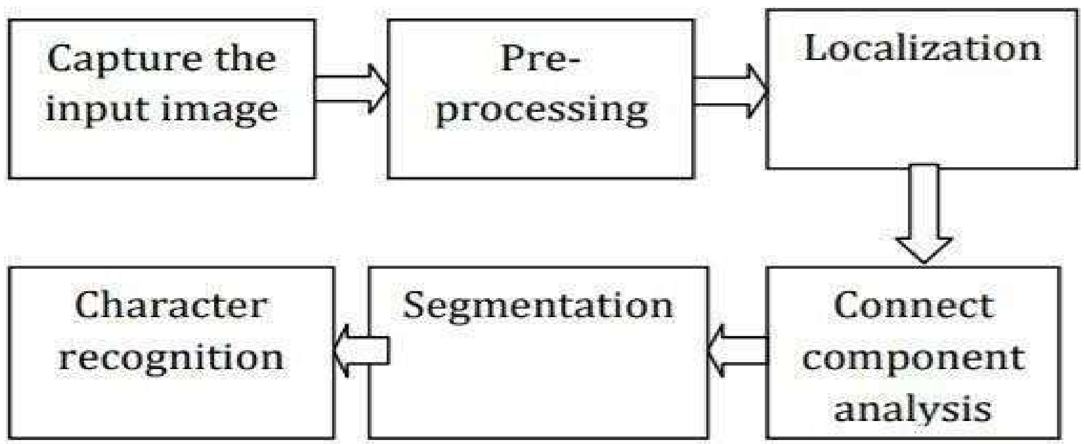
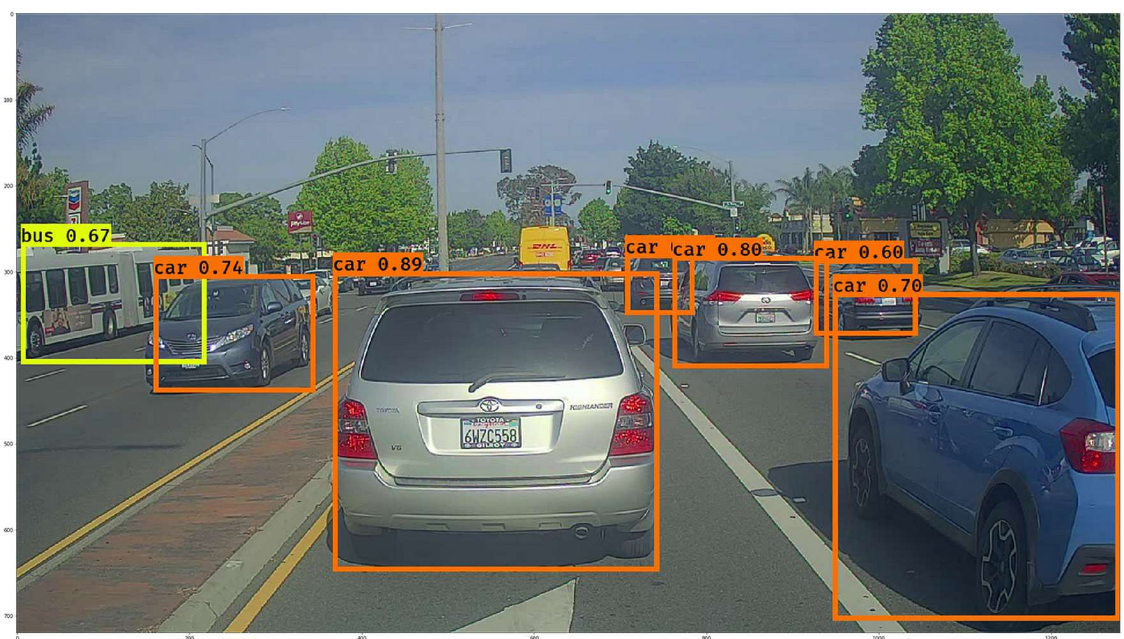
Structure has garnered attention for its An impressive equilibrium between velocity and precision, facilitating swift & dependable object Recognition in photos. Since its Beginning, the YOLO family has undergone many Repetitions, each building upon its predecessor to tackle Restrictions and increase Execution. The paper Strives to offer a thorough examination of YOLO structure's evolution, from the authentic YOLOversion1 to new YOLOversion8, clarifying the key advancements, disparities, & advancements throughout every iteration.

[4]



flow diagram of Object Detection



Object Detection

1.2 Background history:

Yet, the realm of lost and found management is experiencing a significant shift, ushering in an era marked by enhanced efficiency, precision, and user-friendly solutions. This transformation is propelled by the amalgamation of state-of-the-art technologies, such as

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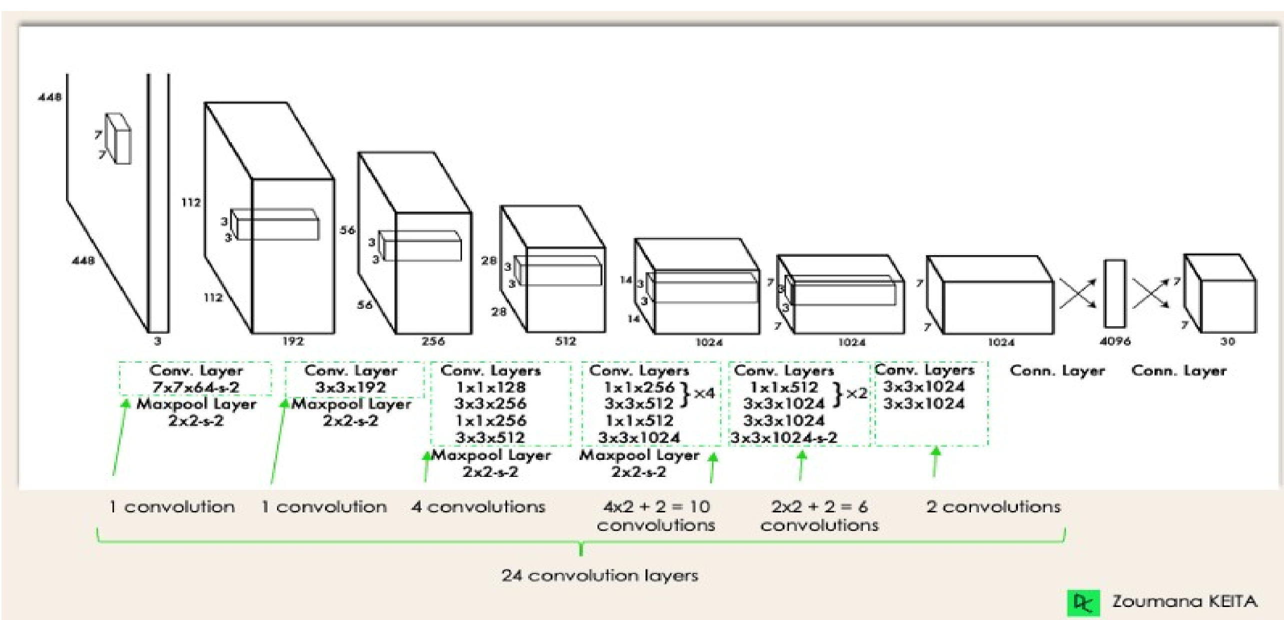
the utilization of Machine Learning (ML), the real-time synchronization of data through Firebase, and groundbreaking YOLO (You Only Look Once) algorithm.

Leading the charge in this technological revolution is the Lost and Found app, standing as a symbol of innovation in the sphere of item recovery and management. Leveraging the capabilities of contemporary technology this application simplifies the procedure of reporting lost items, recognizing found belongings, and reconnecting them with their owners. No longer do individuals need to contend with the tedious task of completing intricate forms or navigating through crowded lost and found desks; the future is now defined by a more intelligent, streamlined, and user-focused approach.

2. Proposed Work Plan:

2.1 General architecture

The focus on object identification aims to detect all instances of objects within a familiar category, such as people, vehicles, or faces in an image. Typically, there is a distinct, limited set of occurrences of the object in the image, yet a large number of potential locations and sizes where each can appear and be examined. Each detection in the image is associated with certain information. Specifically, the position, scale, and area of the object are described within a bounding box. In other cases, the information is enhanced with variables of linear or non-linear transformations; for instance, in facial recognition, a face detector might identify the precise locations of the eyes, mouth, and nose in addition to the bounding box for the face. An example of bicycle recognition is illustrated in the picture below, where the locations of various segments



Object detection working

The system split the picture into S x S framework. If the mid-point of an entity lies in a

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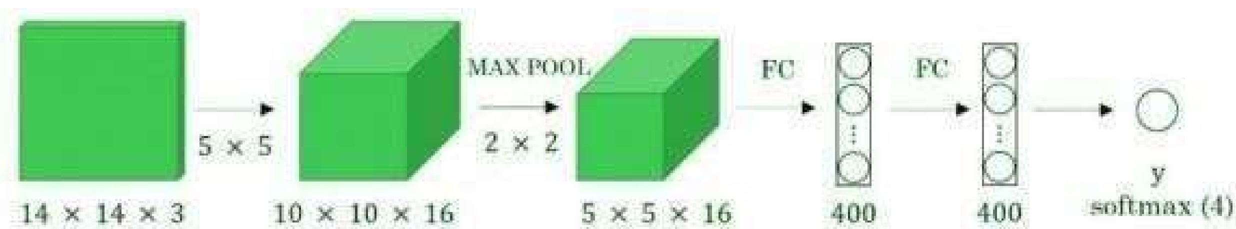
framework cell, then that framework cell will be the reason for recognizing that entity. Every framework cell shows B bounding containers and particular levels for these containers. These particular levels show how specific the sketch is that container have an entity and how precise it thought the container depicts. Every bounding container contains the 5 depictions: x, y, w, h, and that particular level. X and Y shows the mid- point of that container related to the bound of framework entity. The breadth and depth are depicted related to the full picture.

2.2 Algorithm of main complement of the system:

The You Only Look Once (YOLO) algorithm, widely recognized & viral [1], is renowned for its object detection functions. In 2015, Redmon et al. implemented the initial edition of YOLO [2]. Over subsequent years, researchers have introduced several versions, including YOLO version2, YOLO version3, YOLO version4, and YOLOversion5 [3-10], along with repeat-controlled editions such as YOLO-LITE [11-12]. [7] This academic article exclusively focuses on the 5 main YOLO editions, aiming to contrast their key distinction in conceptual designs and implementations.[10] Understanding the primary drive, feature progress, restrictions, and connections among editions is crucial as YOLO versions continue to evolve. [5] This review paper aims to provide meaningful insights for object detection researchers, especially those new to field. The first section will present a version comparison from a technical perspective, highlighting version similarities. [6] The second section will delve into their characteristics using public data, presenting results through pictures & tables. The main examination will focus on YOLO trends and YOLO-associated questions.



How Object Detection Works

2.3 Limitations of YOLO:

YOLO apply hard dimensional parameters on bounding containers depict since every framework cell and only tells two containers and can have unit class. It struggles to predict entities having smaller dimensions. Struggles to predict nearer entities because every framework may predict two bounding containers. It has very less recall and have large number of localization mistakes as compared to Faster R_CNN model.

2.4 Image Segmentation:

Object recognition constructs bounding boxes corresponding to the class in the image.

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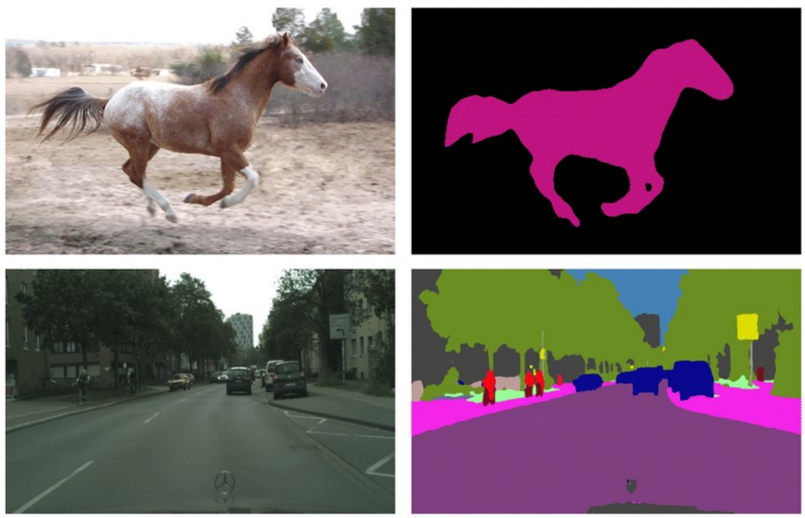
However, it doesn't provide information about the dimensions of the entity. We only obtain the coordinates of the bounding boxes. For our purposes, we need to gather more detailed information, which is currently insufficient. On the other hand, image segmentation generates a pixel-wise mask for each entity in the image. This method provides a more detailed representation of the entities in the image.

Working. We divide the picture into segments. It is not effective to approach the entire picture uniformly, as there may be areas that lack relevant information. By splitting the picture into multiple parts, we can focus on the significant sections for analysis. This is the principle behind image classification. An image is composed of smaller units called pixels. We must group together the pixels that share similar characteristics using image classification. The following image illustrates the concept of image segmentation..[1]



Working of Segmentation

The image segmentation is used in the detection of cancer cells. There are various techniques to do this but this is the most appropriate one. Now, with the increase in technological advancements the image segmentation has made easier many things. There are several more other uses of Image segmentation in transforming industries such as:

1. Crowd Control System for roads.

2. Self-Driving Automated Vehicles.
3. Entity location in satellite picture projection

4. License plate detection

2.5 Experimental Result Analysis:

This part provides a concise summery of the YOLO versions using public data. YOLO algorithm, designed for object detection, was published in 2015, introducing a novel approach to this task. Unlike previous methods that repurposed classifiers for detection [14], YOLO demonstrated competitive performance, although there is room for enhancement. The initial subsection

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highlights algorithm trends, while the second delves into more detailed insights from users. Both subsections utilize quantitative information and written content , demonstrating that YOLO is an ongoing project continuously undergoing updates. All the data presented is sourced from the open dataset on GOOGLE (www.google.com). (Note: YOLO V1 results have been excluded in this section to reduce noise.)

Patterns: Within this segment, data related to publications has been compiled to showcase pattern. Table 1 provides scholarly publication counts for each edition. The breakdown reveals a substantial increase in research paper numbers in the years 2019 and 2020. Notably, YOLO V3 and V2 edition have garnered the most attention from researchers, although the element of time may also contribute. The numbers for V4 and V5 versions are relatively lower, attributed to their novelty in the field.

Table 1. YOLO versions breakdown by years

	YOLO V2	YOLO V3	YOLO V4	YOLO V5	Total
2016	0	0	0	0	0
2017	5	0	0	0	5
2018	47	19	0	0	66
2019	48	210	0	0	258
2020	36	496	81	13	626
Total	136	725	81	13	955

Fig. 1 the data in this section illustrates the evolving interests over time, derived from online search efficiency, encompassing current events search, photo search, and YouTube search. The scale employed is relative, with 100 representing the maximum point & zero the minimum. For instance, an importance of 50 indicates that expression is half as well-liked. From a statistical perspective, a value of zero suggests either insufficient data or a lack of interest in the topic. The depicted figure indicates that, for the majority of the time, V2 and V3 versions enjoy greater prevalence. However, post-April 2020, there is a noticeable surge in popularity for V4 and V5 versions.

This outcome matches the quantitative results from previous Table 1.

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Peiyuan Jiang et al. / Procedia Computer Science 199 (2022) 1066–1073

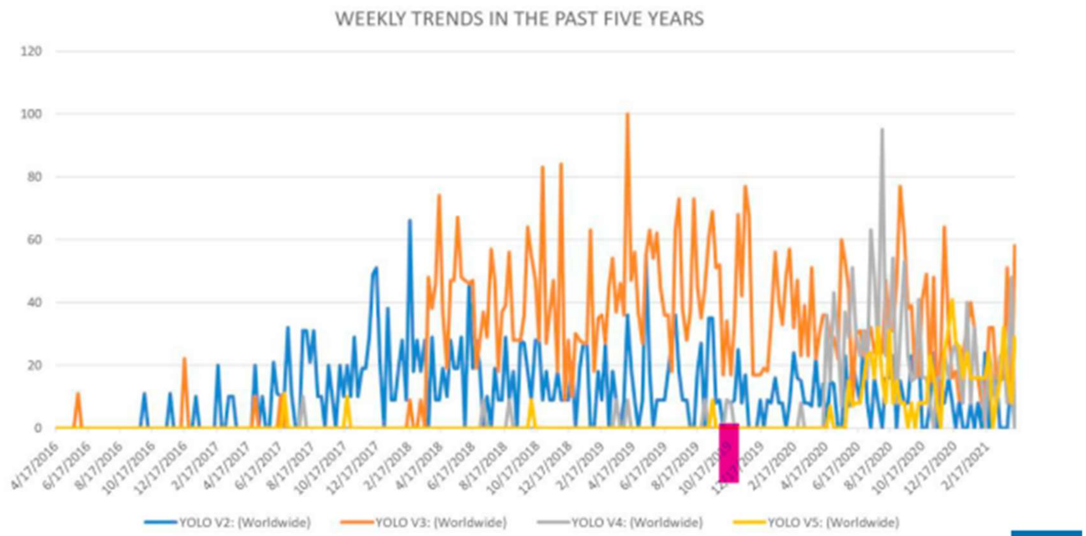
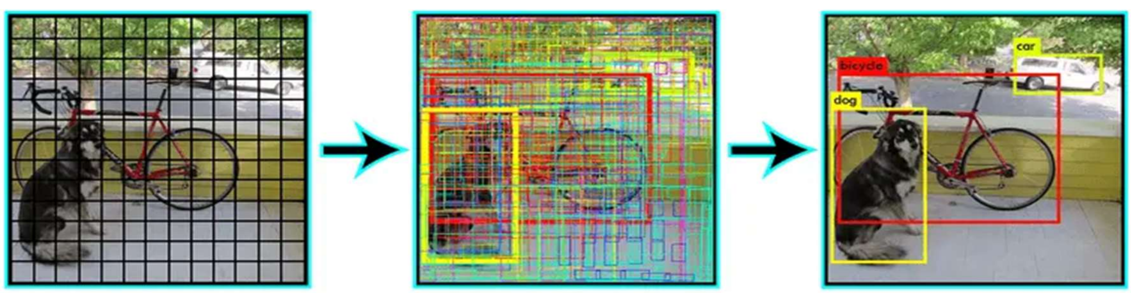


Fig. 1. Weekly trends for YOLO versions in the past five years



Resulted Images

3. Conclusion:

Experiencing the loss of an item, especially one of significance with an emotional connection, can impact emotional well-being. Software solutions offer a remedy for individuals affected by such shortcomings. In response, this article introduces an implementation designed to effortlessly communicate lost and discovered items to the wider community. The search process may be time-consuming, and this implementation facilitates quick searches by informing others about the lost item. You never know who might have found it and is eagerly waiting to return it to you. Locator implementation primarily reflects engaged involvement of society members, largely based on user network participation.

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