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ANALYSING AND IMPROVING EFFICIENCY OF PRODUCTION USING ARTIFICIAL INTELLIGENCE

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Abstract

India has been in a race for the past two and a half centuries but unfortunately it has been a race to the bottom. Most people think that the manufacturing industry is like the services or the agri industry; each industry having its own relative advantages and features. What is not clear to most is that the manufacturing-led economies are unique in being more egalitarian in their distribution of wealth. one of the major criteria to consider is the manufacturing the goods and delivering it at proper lead time. To achieve the tracking of goods production and its on time delivery is required to be taken care. For that technology needs to be integrated with the manufacturing leading to its tremendous improvement. In this project we propose a system to automatically track and trace each step of manufacturing and the time taken incompletion of each step. If the threshold time limit exceeds for any step in the process then an automatic mail will be sent to the manufacturer to automatically take steps for the process complete on time. This is achieved by implementing object tracking methodology in industries.

Keywords: Manufacturing industry, Tracking of goods production, Time Delivery, Automatic Mail, Threshold Limit.

1.0 Introduction

A manufacturing process is the way a business will establish how it will produce its products for its customers. Manufacturing process requirements are completed by operations personnel. Requirements of the facilities and processes and associated costs are identified to enable building production units according to the requirements of volume, time, and safety. Manufacturing process is the steps through which raw materials are transformed into a final product. The manufacturing process begins with the product design, and materials specification from which the product is made and these materials are then modified through manufacturing processes to become the required part. The manufacturing sector is closely connected with engineering and industrial design.

TECHNOLOGY USED

Artificial intelligence

Artificial Intelligence is: the field of study that describe the capability of machine learning just like humans and the ability to respond to certain behaviors also known as (A.I.). The need of Artificial Intelligence is increasing every day. Since AI was first introduced to the market, it has been the reason of the quick change in technology and business fields.

OpenCV

OpenCV was started at Intel in 1999 by Gary Bradsky and the first release came out in 2000. Vadim Pisarevsky joined Gary Bradsky to manage Intel's Russian software OpenCV team. In 2005, OpenCV was used on Stanley, the vehicle who won 2005 DARPA Grand Challenge. Later its active development continued under the support of Willow Garage, with Gary Bradsky and Vadim Pisarevsky leading the project. Right now, OpenCV supports a lot of algorithms related to Computer Vision and Machine Learning and it is expanding day-by-day.

OpenCV-Python

Python is a general purpose programming language started by **Guido van Rossum**, which became very popular in short time mainly because of its simplicity and code readability. It enables the programmer to express his ideas in fewer lines of code without reducing any readability.

OpenCV Applications

OpenCV is being used for a very wide range of applications which include:

- Street view image stitching
- Automated inspection and surveillance
- Robot and driver-less car navigation and control
- Medical image analysis
- Video/image search and retrieval
- Movies - 3D structure from motion
- Interactive art installations

2.0 Existing System

Object tracking is a challenging task in computer vision based intelligent transportation systems. Recently, Siamese based object tracking methods have attracted significant attention due to their highly efficient performance. These tracking methods usually train a Siamese network to match the initial target patch of the first frame with candidates in a new frame. In these methods, the offline training of the deep neural network and the online instance searching are effectively combined. However, these methods usually do not include template update or object re-identification, which easily results in the drift problem

DISADVANTAGES OF EXISTING SYSTEM:

- The disadvantage is that object re-identification is performed to improve the tracking performance
- Only vehicle and pedestrian object tracking is done
- Lack of multiple object tracking.

3.0 Proposed System

India has been in a race for the past two and a half centuries but unfortunately it has been a race to the bottom. Most people think that the manufacturing industry is like the services or the agricultural industry; each industry having its own relative advantages and features. What is not clear to most is that the manufacturing-led economies are unique in being more egalitarian in their distribution of wealth. Secondly, manufacturing led economies are also much more resilient than economies that are led by other industries. Finally, the more importantly relevant for India, the manufacturing industry in India creates more employment opportunities with its growth than any other sector. Insight our research shows us is that manufacturing led economies are much more resilient and robust. And one of the major criteria to consider is the manufacturing the goods and delivering it at proper lead time. To achieve the tracking of goods production and its on time delivery is required to be taken care.

ADVANTAGES OF PROPOSED SYSTEM:

- Cheap and effective solution for manufacturing industries
- Increases the production capacity
- Ensures on-time delivery of goods within the lead time
- Helps in reducing the lead time and providing more quality products in less time.

4.0 Implementation

The working of the total model from the above diagram can be explained as follows. The dataset that is been required for the project training is been collected from various sources which is then trained by a deep learning model. In the training process, MobileNet algorithm is been implemented to increase the accuracy of prediction and come up with a perfect object detection. If necessary network surgery will also be performed where the combination of algorithms takes place to increase the accuracy. A camera will be implemented for the intelligence of monitoring the production unit. The camera is initialized and the trained model is loaded. The object detection is now live. After the script is detecting the object, an object tracking algorithm has been implemented for pixel-wise object tracking. The threshold value with time monitoring has been set. It will be keep on monitoring the objects movement. The object which is moved late to the next work station will be intimated using an email integration.

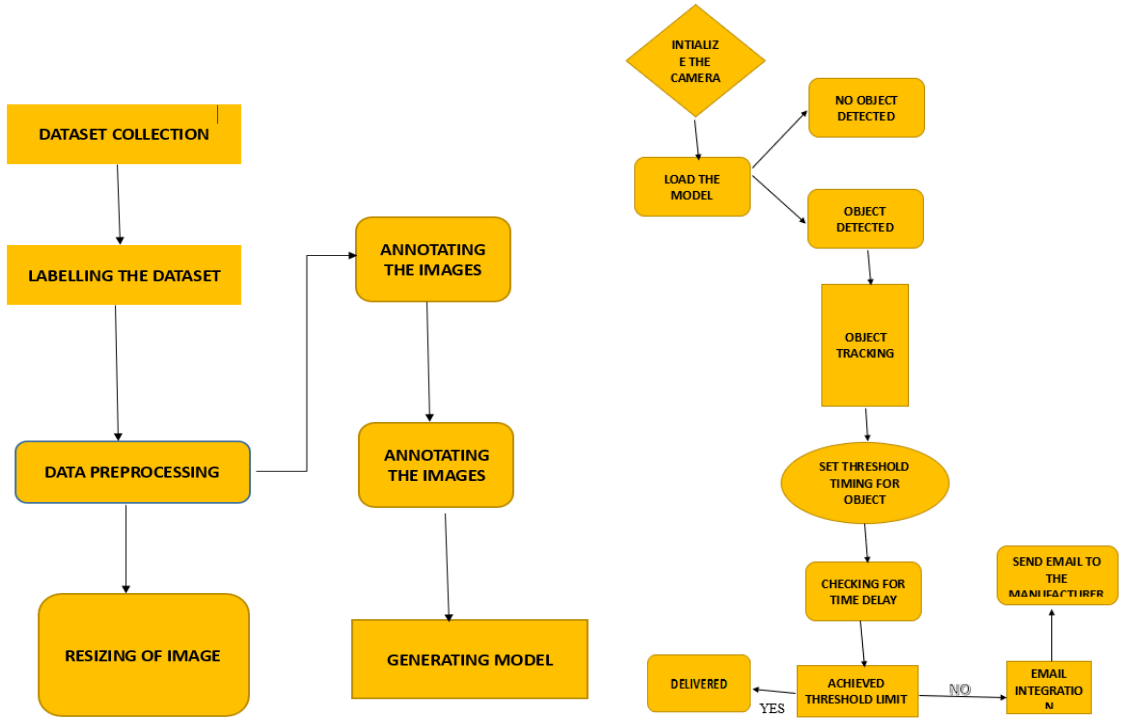

FIGURE 1 ARCHITECTURAL DIAGRAM

5.0 MODULE DESCRIPTION:

- Dataset Collection Module
- Training the Model With Algorithm
- Object detection
- Object tracking
- Email integration

Dataset Collection Module:

Deep Learning has become the go-to method for solving many challenging real-world problems. It's definitely by far the best performing method for computer vision tasks. The image above showcases the power of deep learning for computer vision. With enough training, a deep network can segment and identify the "key points" of every person in the image. These deep learning machines that have been working so well need fuel — lots of fuel; that fuel is data. The more **labelled data** we have, the better our model performs. The idea of more data leading to better performance has even been explored at a large-scale by Google with a dataset of 300 Million images.

Training the Model with Algorithm:

The process of training a Deep Learning model involves providing a Deep Learning algorithm (that is, the learning algorithm) with training data to learn from. The term Deep Learning model refers to the model that is created by the training process. The training data must contain the correct answer, which is known as

a target or target attribute. The learning algorithm finds patterns in the training data that map the input data attributes to the target (the answer that you want to predict), and it outputs a Deep Learning model that captures these patterns. We can use the Deep Learning model to get predictions on new data for which you do not know the target. In this we will be using Emotional algorithm to implement the model and getting the prediction of the model.

Object Detection:

Object detection is a process of finding all the possible instances of real-world objects, such as human faces, flowers, cars, etc. in images or videos, in real-time with utmost accuracy. **Object detection** technique helps in the recognition, detection, and localization of multiple visual instances of objects in an image or a video. It provides a much better understanding of the object as a whole, rather than just basic object classification. This method can be used to count the number of instances of unique objects and mark their precise locations, along with labeling.?" Multi-scale detection of objects was to be done by taking those objects into consideration that had "different sizes" and "different aspect ratios". This was one of the main technical challenges in **object detection** in the early phases. But, after 2014, with the increase in technical advancements, the problem was solved. This brought us to the second phase of **object detection**, where the tasks were accomplished using **deep learning**.

Object Tracking:

Object tracking is a discipline within computer vision, which aims to track objects as they move across a series of video frames. Objects are often people, but may also be animals, vehicles or other objects of interest, such as the ball in a game of soccer.. Object tracking has many practical applications including surveillance, medical imaging, traffic flow analysis, self-driving cars, people counting and audience flow analysis, and human-computer interaction.
There are two main types of object tracking:

- **Offline object tracking**—object tracking on a recorded video where all the frames, including future activity, are known in advance.

- **Online object tracking**—object tracking done on a live video stream, for example, a surveillance camera. This is more challenging because the algorithm must work fast, and it is not possible to take future frames and combine them into the analysis.

Email Integration:

For integrating email we will be using the SMTP protocol which is used for sending and receiving mail as configured by us. The work flow of that module can be seen as follows.

Simple Mail Transfer Protocol (SMTP)

SMTP is the standard protocol for providing email services on a TCP/IP network. This server provides the ability to receive and send email messages. SMTP is an application-layer protocol that provides the delivery and transmission of email over the Internet.

6.0 Conclusion

There are 5 modules that are trained and results obtained are Dataset collection , Training with algorithm, Object Detection, Object Tracking and Email Integration.

- To track and trace each step automatically
- To calculate the threshold limit
- To mail the manufacturer to automatically take steps for the process to complete on time

References:

[1] Yi Liu, Liming Zhang , Member, IEEE, Zhihui Chen, Yan Yan , Member, IEEE, and Hanzi Wang , Senior Member, IEEE "Multi-Stream Siamese and Faster Region-Based Neural Network for Real-Time Object Tracking" [2020, Vol No:1524-9050]

[2] Dong Sun, Renfei Huang, Yuanzhe Chen, Yong Wang, Jia Zeng, Mingxuan Yuan, Ting-Chuen Pong, and Huamin Qu "PlanningVis: A Visual Analytics Approach to Production Planning in Smart Factories" [IEEE 2020]

[3] IEEE Peng Tang, Chunyu Wang, Xinggang Wang, Wenyu Liu, Wenjun Zeng, and Jingdong Wang "Object Detection in High Resolution Remote Sensing Imagery Based on Convolutional Neural Networks With Suitable Object Scale Features" [2019, Vol No: 0196-2892].

[4] Qibin Hou, Ming-Ming Cheng, Xiaowei Hu, Ali Borji, Zhuowen Tu, Philip H. S. Torr "Deeply Supervised Salient Object Detection with Short Connections" [2018, Vol. No: 0162-8828].

[5] Waqas Aftab, Roland Hostettler, Member, IEEE, Allan De Freitas, Mahnaz Arvaneh, and Lyudmila Mihaylova, Senior Member, IEEE "Spatio-temporal Gaussian Process Models for Extended and Group Object Tracking with Irregular Shapes" [2018,Vol.No:0018-9545].