Artificial Intelligence Project Documentation

Project Tittle ***Real Time Object Detection***

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Research & Development by Engineer Falak Shair Khalid
(Falakwarraich143@gmil.com)
(Junior Software Engineer)
(M.Phil. Information Security at Lulea University of Technology, Sweden)

Company Profile ***https://www.leitek.co/***

Abstract

Real time object detection (YoloV3 and Dark-net Algorithms) is project is one of creative idea that was introduced CEO of LEITEK INNOVATIVE SOLUTION at Lisbon, Portugal. In this project we deal with several type of objects detects to drone camera. We use a flying drone that integrated with web-based application. Drown use camera for live streaming as well as use GPU for high resolution and communicated with web-based application that are developed open source plate form Flask of python. In this project we deal 82 type of classes object like Person, Cycle and Car with help of dark net algorithm. Convolution Neural Network is backbone of dark net that are implemented and specially designed for object detection. CNN have several hidden layers that are full connected to each other and neuron as passed the input and output in CNN model. CNN model is used deep learning approaches for training and testing of image classification with the help of tensor flow and kera's with own data set.

Methodology used in this project

Yolo: **YOLOv3** (You Only Look Once, Version 3) is a real-time object detection algorithm that identifies specific objects in videos, live feeds, or images

How it is Work: YOLO struggles with small objects. However, with **YOLOv3** we see better performance for small objects, and that because of using short cut connections. Using these connections method allows us to get more finer-grained information from the earlier feature map.

Accuracy: YOLOv3 is extremely fast and **accurate**. In map measured at. 5 IOU YOLOv3 is on par with Focal Loss but about 4x faster. Moreover, you can easily tradeoff between speed and accuracy simply by changing the size of the model, no retraining required!

YoloV3 Architecture: **YOLO v3** uses a variant of Dark net, which originally has 53-layer network trained on Image Net. For the task of detection, 53 more layers are stacked onto it, giving us a 106 layer fully convolutional underlying architecture for YOLO v3.

	Type	Filters	Size	Output
	Convolutional	32	3 × 3	256 × 256
	Convolutional	64	3 × 3 / 2	128 × 128
1×	Convolutional	32	1 × 1	
	Convolutional	64	3 × 3	
	Residual			128 × 128
	Convolutional	128	3 × 3 / 2	64 × 64
2×	Convolutional	64	1 × 1	
	Convolutional	128	3 × 3	
	Residual			64 × 64
	Convolutional	256	3 × 3 / 2	32 × 32
8×	Convolutional	128	1 × 1	
	Convolutional	256	3 × 3	
	Residual			32 × 32
	Convolutional	512	3 × 3 / 2	16 × 16
8×	Convolutional	256	1 × 1	
	Convolutional	512	3 × 3	
	Residual			16 × 16
	Convolutional	1024	3 × 3 / 2	8 × 8
4×	Convolutional	512	1 × 1	
	Convolutional	1024	3 × 3	
	Residual			8 × 8
	Avgpool		Global	
	Connected		1000	
	Softmax			

Darknet Algorithm: Dark net is an open source neural network framework written in C and CUDA. It is fast, easy to install, and supports CPU and GPU computation. ... Recurrent neural networks are powerful models for representing data that changes over time and Dark net can handle them without making use of CUDA or OpenCV.

Darknet Training model steps:

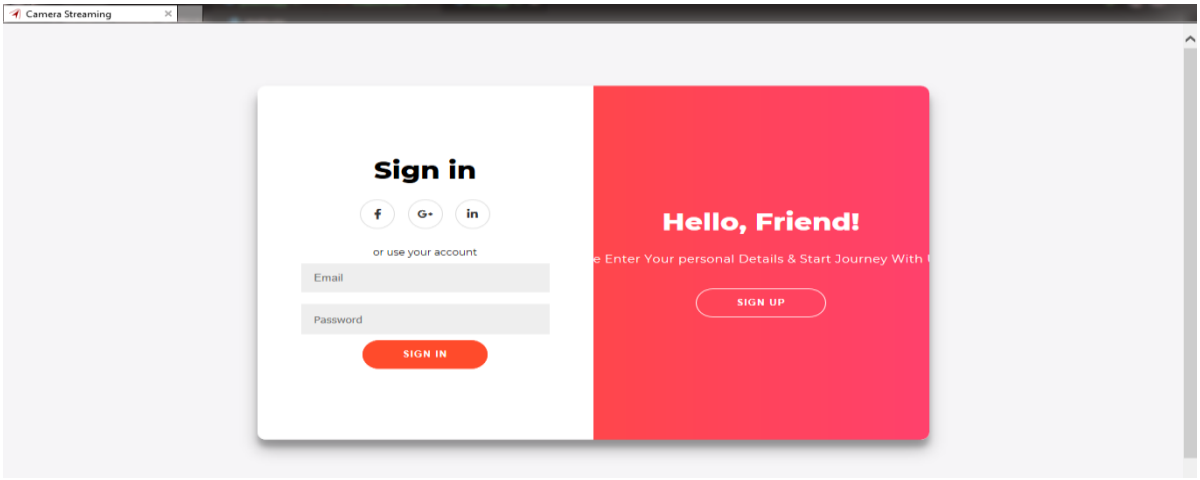
- ✓ Install Darknet. If you don't have installed already, do it: git clone https://github.com/pjreddie/darknet cd dark net make.
- ✓ Get The Data.
- ✓ Make A Dataset Config File.
- ✓ Make A Network Config File.
- ✓ Train the Model.
- ✓ Validate the Model.

Deep Learning: Deep learning is a type of machine learning and artificial intelligence (AI) that imitates the way humans gain certain types of knowledge. Deep learning is an important element of data science, which includes statistics and predictive modeling.
Deep learning utilizes both structured and unstructured data for training. Practical **examples of deep learning** are Virtual assistants, vision for driverless cars, money laundering, face recognition and many more.

Application Interface:

1. User Login/ Registration

this is first page of our project first we run project and click the URL then browser automatically on browser. This data store in SQLite data base of user information Like email and password after then use will be login successfully.

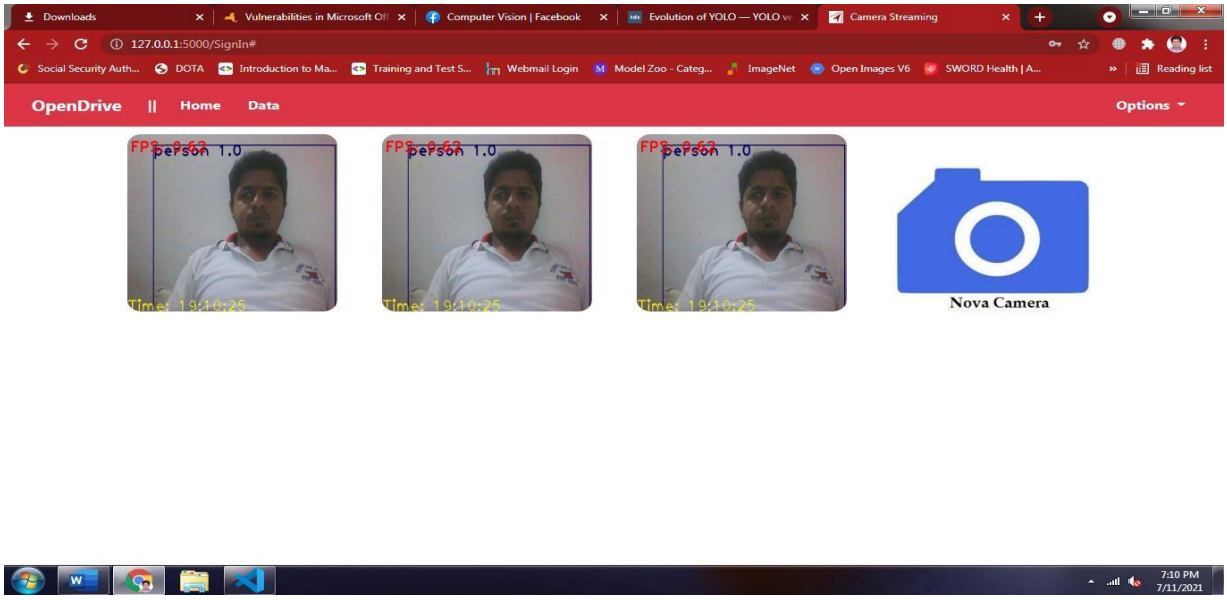


2. Home Page

After login the next page is shows home page. This page shows the information of Home and Data tab. Home tab is use for live streaming and camera icon is button. When you presses the button then you camera is one and live streaming are start In this page form of small divider.

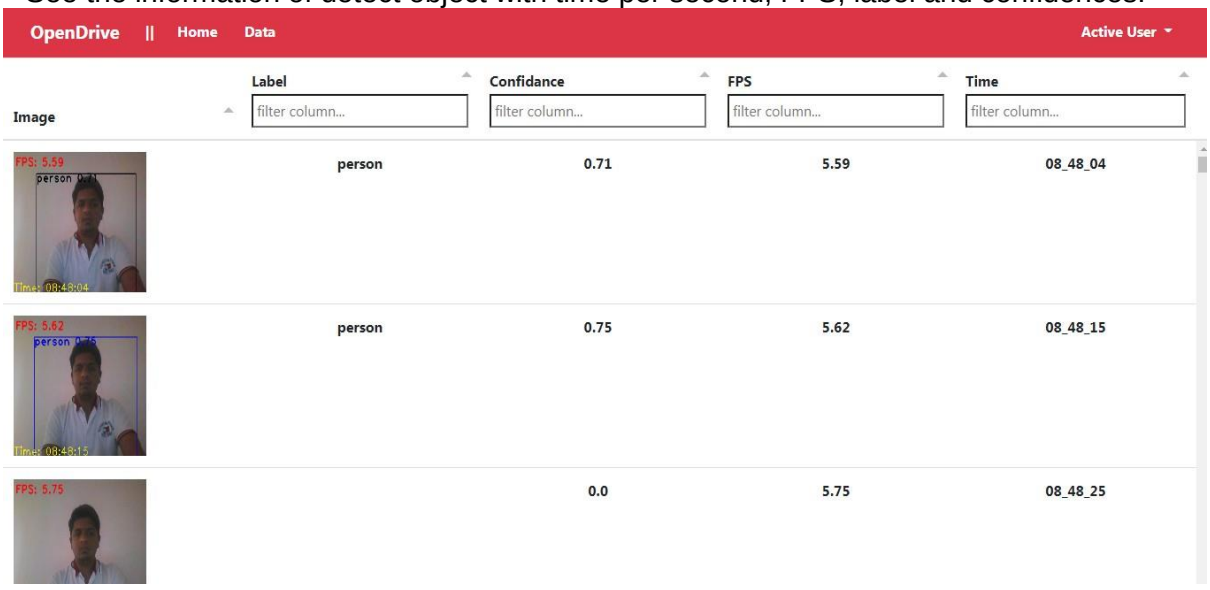
3. *Live camera streaming*

In this module dark net algorithm run as backend and perform detection with high accuracy on web page. We performed detection with help of YoloV3 and Darknet. We detect 82 type of classes object by use Yolov3 and darknet.



4. *Data Storing*

This is data storing phase. All video are streaming on Home page after that detection of object Store in SQLITE data base then show the all information on web page from data base and See the information of detect object with time per second, FPS, label and confidences.



Technology stack uses:

Python

OpenCV

SQLite

YoloV3

Deep-Learning

Tensor Flow

Darknet-Algorithm

Flask

PyCharm

References:

- ✓ ***https://pjreddie.com/darknet/***
- ✓ ***https://viso.ai/deep-learning/yolov3-overview/***
- ✓ ***https://www.youtube.com/watch?v=oQcAKvBFli8 &t=829s***
- ✓ ***https://github.com/pjreddie/darknet/tree/508381 b37fe75e0e1a01bcb2941cb0b31eb0e4c9/cfg***

Junior Engineer of LEITEK