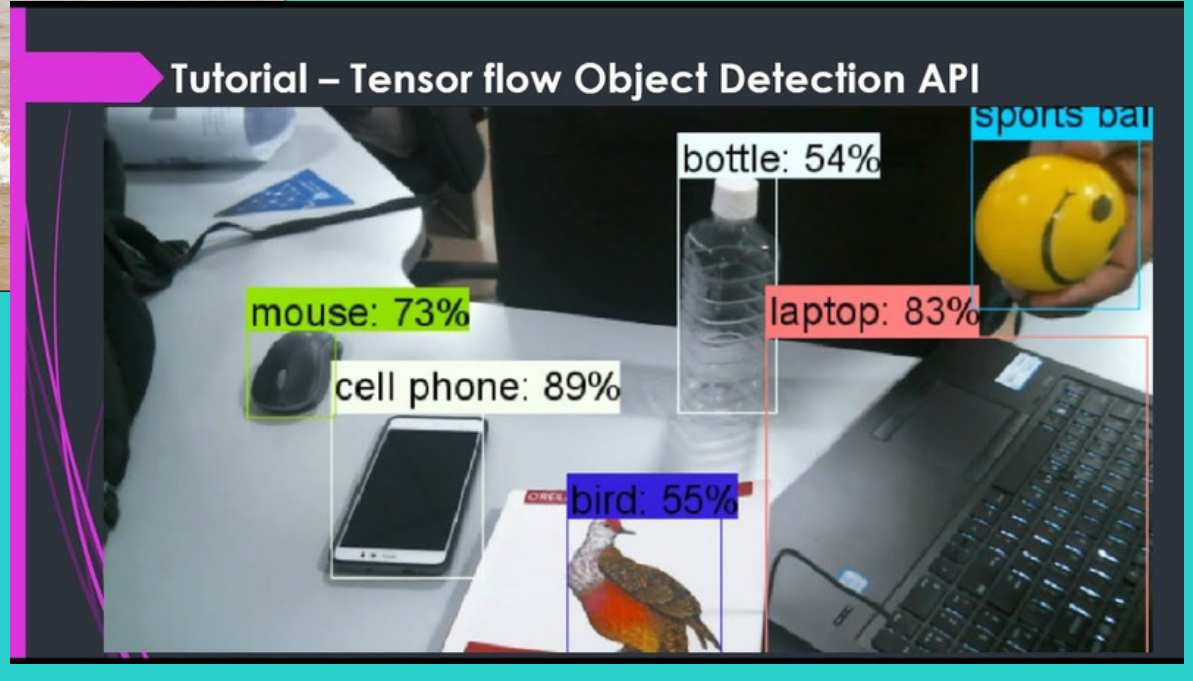
Ojects recognition on images using tensorflow api and opencv.

ZAKIRYANOV ANUARBEK 3EN04D
DEPARTMENT OF COMPUTER SCIENCE
150107055@STU.SDU.EDU.KZ

abstract

OBJECT RECOGNITION IS ONE OF THE MOST INTERESTING AND HARDEST ISSUES IN MACHINE LEARNING AND COMPUTER VISION. CREATING ACCURATE MACHINE LEARNING MODELS CAPABLE OF LOCALIZING AND IDENTIFYING MULTIPLE OBJECTS IN A SINGLE IMAGE REMAINS A CORE CHALLENGE IN COMPUTER VISION. THE TENSORFLOW OBJECT DETECTION API IS AN OPEN SOURCE FRAMEWORK BUILT ON TOP OF TENSORFLOW THAT MAKES IT EASY TO CONSTRUCT, TRAIN AND DEPLOY OBJECT DETECTION MODELS.TENSORFLOW'S OBJECT DETECTION API IS A VERY POWERFUL TOOL THAT CAN QUICKLY ENABLE ANYONE (ESPECIALLY THOSE WITH NO REAL MACHINE LEARNING BACKGROUND LIKE MYSELF) TO BUILD AND DEPLOY POWERFUL IMAGE RECOGNITION SOFTWARE. HOWEVER SINCE IT'S SO NEW AND DOCUMENTATION IS PRETTY SPARSE, IT CAN BE TOUGH TO GET UP AND RUNNING QUICKLY. MAIN PART OF PROJECT IS CREATING
USEFUL TOOL FOR DETECTION OBJECTS ON IMAGES AND PREDICT TO WHICH CLASS ARE BELONG THIS OBJETCTS. TOOL WILL BE A WEB APPLICATION WITH FRONT-END AND BACK-END,ON FRONT-END USER CAN LOAD SOME IMAGE OR VIDEO AND BACK-END WILL PROCESS THE INPUT AND OUTPUT THE RESULT.

how it will looks like



steps

1. **WEB PAGE WITH IMAGE UPLOAD BUTTON**

   When user comes on that web-application, he or she will see button which uploads image to the server. Also on web page will be brief instruction about how to use this web-app.

2. **AFTER IMAGE UPLOADED**

   After image uploaded the server will process the image and user will see loading indicator.

3. **IMAGE IS PROCESSED**

   After image was processed server will send new image with labels around objects and show old and new images

prototype

WEB PAGE

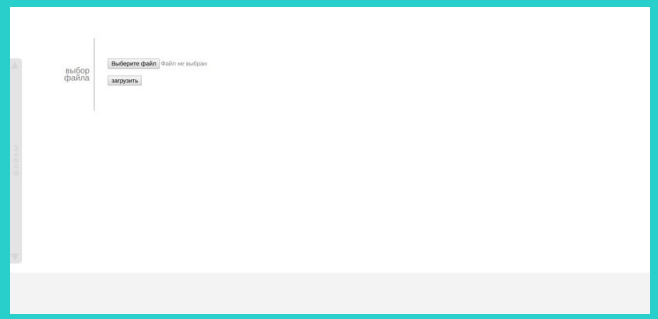
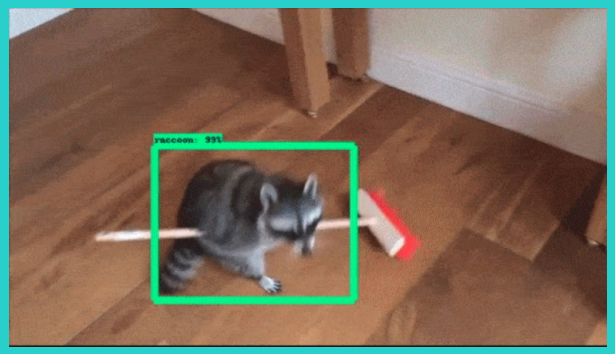


IMAGE UPLOAD

IMAGE PROCESSING

SHOW THE RESULT



keywords

- Tensorflow
- Opencv
- Web
- ML methods
- Object recognition

motivation

Why this project important ? In our modern world people very often use their cameras to make photos and videos,also government place a lot of cameras in the cities. All this images(data) we can preprocess using ML and CV. It can helps us to make out life better. For example there are already exist systems for detecting criminal people using street cameras,
also all of us heard about self-driving cars,which should detects multiple obects on the road,is it people or car or traffic light. Provide statistical evidences. Chinese police have already detained more than 30 offenders thanks to clever glasses that make it easier to recognize faces.

objectives

1. THE USERS CAN USE THE SYSTEM IN ANY HOUR OF THE DAY AND GET REAL-TIME FEEDBACK

2. THE APPLICATION IS EASY TO USE, EFFICIENT AND FREE OF CHARGE

3. PEOPLE CAN UPLOAD ANY PHOTO AND GET ALL INFORMATION ABOUT OBJECTS ON THAT IMAGE

4. USE THIS ALGORITMS IN SELF-DRIVING CARS OR IN ROBOTS CAN BE VERY USEFUL

5. VERY PROMISING TECHONOLOGY WHICH WILL BE EVERYWHERE IN NEAREST FEATURE

Introduction

In this project i will use next technologies: Tensorflow framework, Opencv library, python 2.7. There is will be a web-application, which will get user's image and find all objects on that image and then show the result.

literature survey

01 https://towardsdatascience.com/real-time-object-detection-with-tensorflow-detection-model-e7fd20421d5d - Article

02 https://github.com/tensorflow/models/tree/master/research/object_detection - Tensorflow api

03 https://www.oreilly.com/ideas/object-detection-with-tensorflow - Book

04 https://medium.com/@WuStangDan/step-by-step-tensorflow-object-detection-api-tutorial-part-1-selecting-a-model-a02b6aabe39e - Objects recognition tutorial

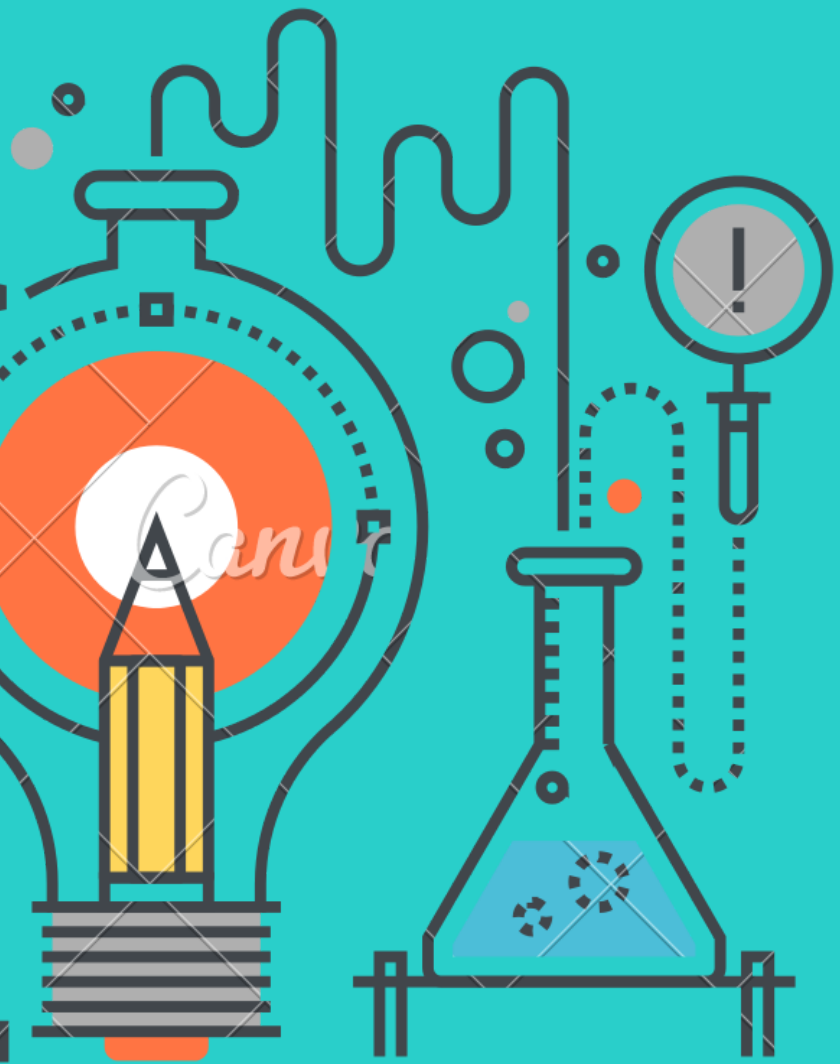
05 https://www.youtube.com/watch?v=COIbP62-B-U&list=PLQVvvaa0QuDcNK5GeCQnxYnSSaar2tpku - Video course about object detection

materials and methods

I have used https://github.com/tensorflow/models/tree/master/research/object_detection repository to download pretrained model. Here i use 'ssd_mobilenet_v1_coco_2017_11_17' model for object detection. We use file 'frozen_inference_graph.pb' as actual model file that is used for detection. To test model, we have 'test_images' folder with different prepared images. Also I have found a dataset to train my own mode,based on that api, but have some issues with my pc, because to train one model can take a lot of time, about 2-4 days for 300 images dataset.

conclusuion

I have created a web application based on Tensorflow Object Detection open source framework built on top of TensorFlow that makes it easy to construct, train and deploy object detection models. I should have done my own model,based on that api, but have some issues with my pc, because to train one model can take a lot of time, about 2-4 days for 300 images dataset. This object detection framework can be used not only in web application but in many other applications, systems, can be very useful and simplify life of modern people.



thank you!