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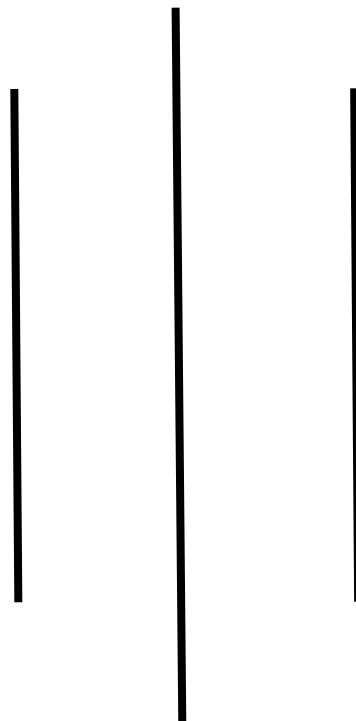
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# Specification Document Of Final ProductionProject



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Bsc(Hons) Computing

# Comparison of Object Detection Models in TensorFlow

## Project Aim:

The main aim of the project is to help AI developers to use appropriate object detection models in machine learning using the TensorFlow framework.

## Objectives:

The main objective is to develop a product which:

- Compares different Object detection model trained for a specific dataset.
- Identifies the time taken to load each detection model.
- Identifies the number of objects recognized by each detection model.
- Identifies the accuracy of objects detected by each detection model.
- Has been successfully tested and evaluated.

## Product Specification:

The product specification is categorized into functional and non-functional requirements and is described below with MoSCoW method:

Functional Requirements	MoSCoW
Compare model trained on MSCOCO data sets	M
Determine time taken to load the model	M
Determine number of objects detected	M
Determine accuracy of the objects detected	M
Compare model trained on other data sets	S
Product has a GUI interface	S
Compare more than two models at once	C
Compare models trained on different datasets	W
Compare object detection model of other frameworks except TensorFlow.	W
Can train or fine-tune the models	W

Non-Functional Requirements	MoSCoW
Developed using free software products	M
Product is tested and validated	M
Product is user friendly	S
Product shall be platform independent	C
Product has a time limit for comparison	W
Identifies the ideal object detection model	W

## Research:

Object detection is a simple mechanism of identifying the locations of different objects present in an image (Lars, 2018). Neural networks are one of the leading machine learning algorithm which has been able to process, detect and optimize large datasets, also in image processing. TensorFlow is a new open source framework provided by Google which helps to model these neural networks. (Padhnis, et.al, 2018). The TensorFlow Detection API makes the process of constructing, training and deploying of the object detection model very smooth. With the API, a model is defined using a configuration files and API is responsible for structuring all other necessary elements on its own (TensorFlow, 2018). In the framework, most of the developers tend to use pre trained models to extract the features for which it is necessary to have proper experiment with different approaches. (Lars, 2018) For which this research would compare the object detection models trained specifically on MSCOCO data sets.

## Evaluation:

As defined in the product specification and objectives, the evaluation of the end product would base on the fulfillment of the objectives. For evaluation, the models would be first tested separately which means determining time, accuracy and detected classes of a single model respectively than we compare this individual result with the result we get after comparing two or more models in the product. The evaluation method would include both quantitative as well as qualitative mechanism. For instance, it would evaluate the response of the product when more than two models are given up for comparison along with their results.

## Project Planning and Methodology:

After the research, initially a particular data sets and object detection models trained on those particular data sets would be chosen. MSCOCO data sets are one of the popular training data sets which includes 80 different categories of objects and models including `ssd_inception_v2_coco`, `faster_rcnn_resnet101_coco`, `rfcn_resnet101_coco` and so on are trained on those data sets. After selecting the models and the datasets I would look for the way to implement any of the selected models to detect the objects in any random image. The image would consist of multiple objects present in MSCOCO data sets. Once the model has successfully detected the objects in the image, we load another model trained on the same dataset and see the results which at last are compared with the results of the previous models. The project would follow Agile methodology and the planning is further clarified using the Project Timeline and Gantt chart.

## Project Timeline



## Gantt Chart:

Task Name	Duration	Start	Finish
<b>Final Project</b>	<b>146 days</b>	Mon 9/24/18	Sat 4/13/19
<b>Feasibility Study &amp; Planning</b>	<b>15 days</b>	Mon 9/24/18	Fri 10/12/18
Search Topic	4 days	Tue 9/25/18	Fri 9/28/18
Research Project Scope	6 days	Sat 9/29/18	Fri 10/5/18
Requirement gathering	5 days	Sat 10/6/18	Thu 10/11/18
<b>Initiation &amp; Planning</b>	<b>9 days</b>	Fri 10/12/18	Wed 10/24/18
Initial Research & Planning	5 days	Fri 10/12/18	Thu 10/18/18
Develop Project Specification	3 days	Fri 10/19/18	Tue 10/23/18
Submit Specification Document	1 day	Wed 10/24/18	Wed 10/24/18
<b>Research</b>	<b>20 days</b>	Thu 10/25/18	Wed 11/21/18
Literature Review	10 days	Thu 10/25/18	Wed 11/7/18
Research Methodology	10 days	Thu 11/8/18	Wed 11/21/18
<b>Development Phase</b>	<b>65 days</b>	Thu 11/22/18	Wed 2/20/19
Design	14 days	Thu 11/22/18	Tue 12/11/18
Develop	42 days	Wed 12/12/18	Thu 2/7/19
Documentation	9 days	Fri 2/8/19	Wed 2/20/19
<b>Implement</b>	<b>3 days</b>	Thu 2/21/19	Mon 2/25/19
<b>Testing &amp; Evaluation</b>	<b>32 days</b>	Tue 2/26/19	Wed 4/10/19
White Box Test	10 days	Tue 2/26/19	Mon 3/11/19
Black Box Test	10 days	Tue 3/12/19	Mon 3/25/19
Track & Solve Issues	12 days	Tue 3/26/19	Wed 4/10/19
<b>Closing</b>	<b>2 days</b>	Thu 4/11/19	Fri 4/12/19
Submission Of Final Product	1 day	Thu 4/11/19	Thu 4/11/19
Presentation	1 day	Fri 4/12/19	Fri 4/12/19

Fig: The above Gantt chart shows the project planning along with the key dates.

## Resources:

The list of resources (hardware and software) are listed below. All the software are free open source products and can be easily downloaded online.

### List of Software:

- Protobuf 3.0.0
- Python-tk
- Pillow 1.0
- lxml
- Matplotlib
- Eclipse
- Java JDK
- Ubuntu 16.04
- Tensorflow ( $\geq 1.9.0$ )
- Cython
- contextlib2
- cocoapi

### List of Hardware:

- Lenovo Y40 Laptop
- AMDA Radeon Graphic

## Bibliography:

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