Machine Learning Engineer Nanodegree

Domain background

Nowadays the latest research on Object Recognition has achieved decent advancements in regards to Machine Learning. Training an Artificial Neural Network (ANN) to recognize objects with a fairly high accuracy seems very trivia with the current tools and resources. If we look back in time and ask the question what made it possible? The answer often is rhetorical since the asner mostly brings us to exponentially higher computational power and larger amount of data. The latter is what I find more interesting on focusing with the aim that by using the right quality data the computational demand optimizes.

Therefore, in the following parts of this project proposal another approach to optimizing the quality of datasets is proposed. The datasets experienced for this project are recommended for a small scale project contatining a small to medium dataset of images.

Problem statement

The issue of complex ata associated with higher requirements of computational resources in addition to the time made me rethink “the big-data”. Experience of training an ANN has showed me that most of my time spent when performin Machine Learning tasks is dedicated to date pre-processing and other foras to make ite feasible for an ANN.

Th epotetnail solution I propose would be to avoid using large amounts of data containing complex datsets. The reason relates to the fact that many datasets hae repetitive data that do not contribute to an efficient learning rate. For instance, when training an ANN to detecting an object you could use a very large datasets containing images of objects of vaiuos size an din different context. In this way, the information that those datasets can contribute might not contain useful information of the learning rate for the neural network of choice.

This can be done inpublic datasets like… containin thus much objects… you can measure its efficiecnty of learning orst by the size of the images and second by the variety of objects the dataset contain, repetitive objects in the same or similar contex that do not produce the same information compared cases where context changes. Onw ay to determine the information a dataset could provide is to prepreocess the datse for objects in repetitive contexts. The new dataset create should have images that re cleaned and filtered. On a small scale one can replicate this problem with capturing images of the same objects in the same context from different points of view. To findthe optimal image that provde more information to recognizing an object the following can be considered

Accounting for optimal lighting and color variations

Optimising object size and perspective

Optimal number of object variations

Datasets and inputs

The test dataset was obtained from Kaggele: httllps://www.kaggle.com/ containg simple veryday images of objects like chir , table desk etc. It ill be sued to feed the input of the neural network in order to train the model to recognize the objects

Solution statement

The sution proposes a new approach to recmobning datasets content and optiomise for better quality of input data for an ANN. The compact dataset will then bue used to train the network using fewer images aiming to reducte the processing time an duse of resources

Benchmark model

Choose different frameweorks to train yourmo del and compare among them how dows your ann train efficiency change. Calculat the compute time type(s) of resources used and accuracy achieved> this can be repeated with the following ramesowrsk XGBoost – Tensofrlow – Pytorch - SKlearn

Evaluation Metrics

Compare the model accuracy and compute effifiency comarping the original datset with the new dataset. Plot the copute efficiencfy and dtaset accuracy for both datasets to determine the quality of your new dataset.

Project design

Start with exploring the contetnt of the dataset and pre-rocess it open the dataset readings its content(images) after pre-processing find you what variables/ propertiesl contribute best to object detection – apply filter to imates that show similar size view point

Apply optimization to images preserving the integrity of variables chose. – Optimise for variety in contexts the objects.

Verify the new dataset created check the size and dimension of images.

Apply test…

Presentaion

[1] S. Zhi, Y. Liu, X. Li, and Y. Guo, LightNet: A Lightweight 3D Convolutional Neural Network forReal-Time3DObjectRecognition

[2]Nibs K.Logothetis and David L.Sheinberg, Visual Object Recognition.

[3]Gevers Arnold W.M.Smeulders, Color-basedobjectrecognition.