Capstone Project Proposal

By

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Domain background

The capstone project, is basically how to understand and use perfectly aws sagemaker resources together with pytorch to perform a computer vision task. This project will make use of the famous mnist fashion dataset on image classification model to create an efficient model with a convolution neural network. The benefit of computer vision is to enable computers to see the world or objects as humans do. And with the help of pretrained models, a machine learning framework such as pytorch and AWS sagemaker, this process can be a lot simplified when using a convolutional neural network alogrithm. The model created during this project can serve as a useful tool to fashion brands, their customers would get a good experience when using this tool to select a particular fashion item of their choice.

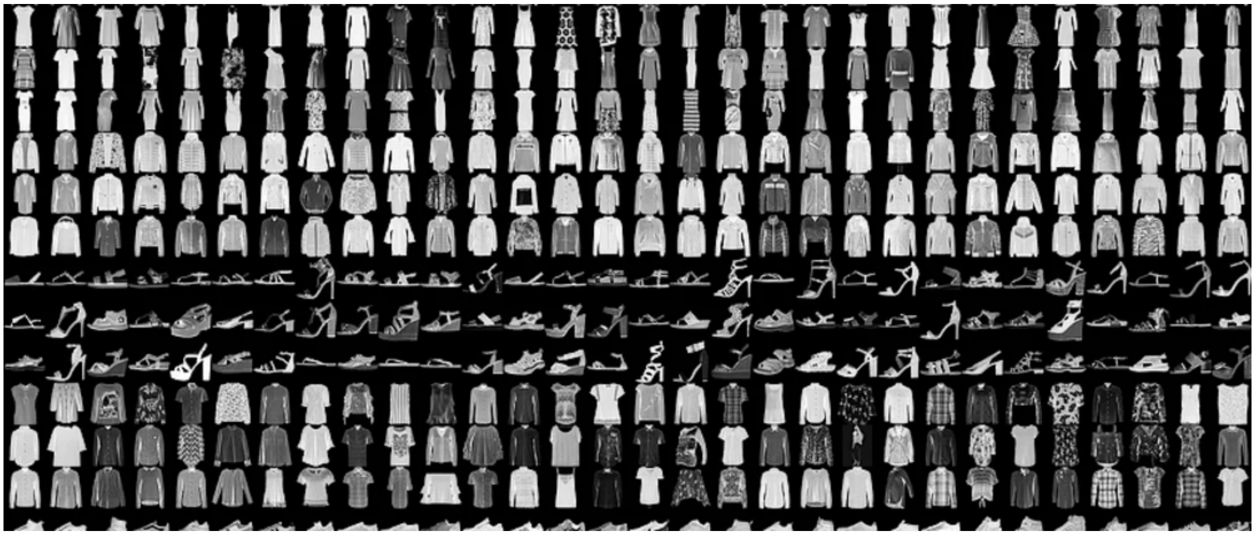
The aim of this project is to master the use of creating image classification models with AWS sagemaker because it is a core part of computer vision and machine learning engineering in general

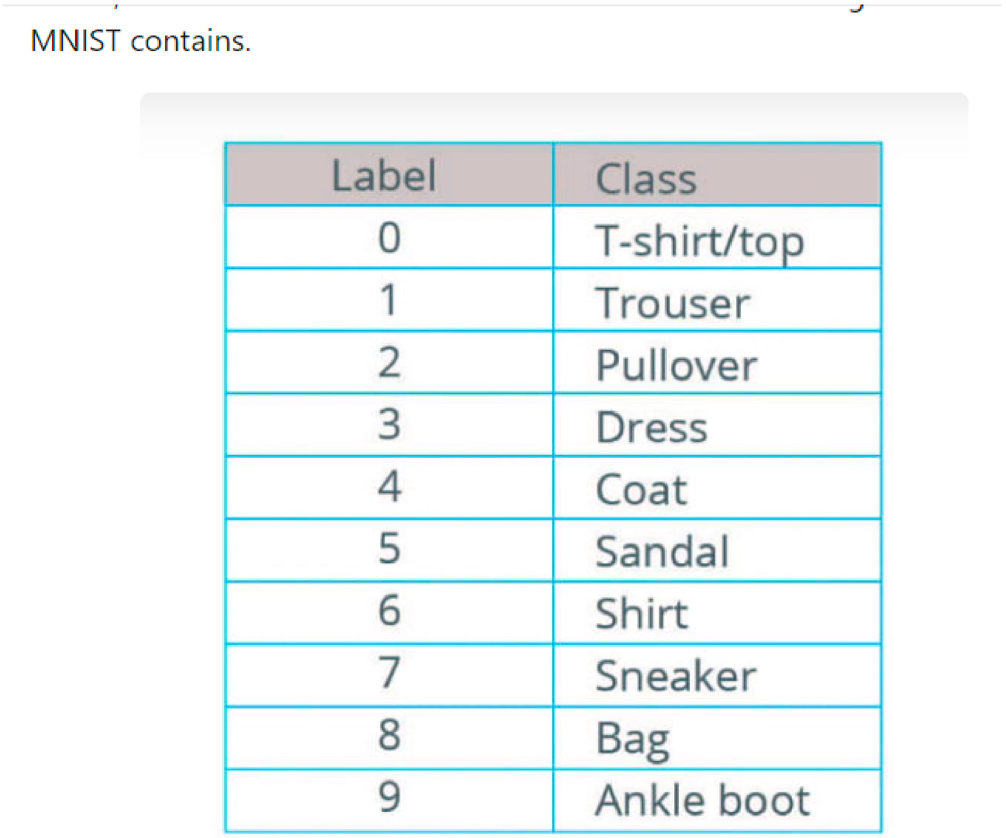
Problem statement

Computer vision is an interdisciplinary scientific field that deals with how computers can gain comprehend the visual world in the form of images and videos. From an engineering perspective, it seeks to replicate and automate tasks that the human visual system can do. With this project in mind, the problem clearly classifying fashionable wear by a computer would be possible. For instance, this problem would help to improve customer experience on a fashion brand website

Datasets and inputs

The dataset that would be used for this project is the MNIST dataset, made publicly available. It consists of about 60000 images grouped in 10 classes of fashion wears. This dataset contains grey scale images of sizes 28 by 28. For easy usage and processing, I will split the data into train, valid and test folders, containing subfolders subsequently. In training the model, I will use inputs such as pre-trained models (ResNet34,18, VGG-16 whichever gives the best performance) to perform training and evaluation as well. After preparing the data, I wil upload it to AWS S3 where training was carried out with pyTorch.





MNIST contains.

Label	Class
0	T-shirt/top
1	Trouser
2	Pullover
3	Dress
4	Coat
5	Sandal
6	Shirt
7	Sneaker
8	Bag
9	Ankle boot

Evaluation metrics

The approach to evaluate the performance of this project is by getting the accuracy of the model.

Benchmark model

As I work on solving this problem, the benchmark I hope to bit is the model accuracy of 90 percent. This target should be achievable with pre-processing of train dataset and proper hyperparameter tuning and other feature engineering that could be discovered during the project.

Solution statement

The proposed solution is to create a deep learning model that is able to identify accurately the presence of the fashion items (basically the 10 fashion classes) with a high percentage accuracy by using amazon sagemaker. This solution can enable fashion brands to provide good customer service experience when using this tool to select a particular fashion item of their choice.

Project design

The workflow to approaching the solution is as follows: With the right exploratory data analysis, I will explore the data to understand, prepare the data, making it easy to train the model. The right pre-processing technique with torchvision such as image normalization would be done thereby enhancing the model's performance to obtain the desired solution. After specifying the sagemaker environment, I will commence training the model with a RESNet18/34 or VGG-16 (whichever gives a better performance) and a python script as entry_point, creating a pytorch estimator, setting hyperparameters(the learning rate and batch size) before calling model.fit(). Sagemaker debugging and profiling will also be done on the model. The model will be finally deployed to an endpoint.

Reference

https://dev.to/sandeepbalachandran/machine-learning-dense-layer-k2i

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