

WEEK 1

I was given an overall view of the stuff that is being worked on at TNeGA. I was assigned to work in AIML team along with Mr. Amol, Mani, Ravi and Saran under the supervision on Mr. Chokolingam.

The first task assigned to me was from Mr. saran regrading time series, task being to clean time series data and do some feature extractions. I successfully completed the task of cleaning the data and started to work on ideas for various features we can use. I was also asked to get familiar with time series terminology.

The second task given to me was by Mr. Ravi, task being to get familiar with Computer vision by annotating license plate in truck images. I completed annotating the images by the end of the day. I was also told to find the meaning of the text on the annotation file. Which I was able to find and was the class followed by bounding box of that particular class.

The third task given to me was by Mr. Ravi, task was to research and learn about Yolov5 and use it for detection of license plate from an image. I finished researching about how it works and how to implement it. I was able to finish this task by the end of that week and the results were also good.

On Friday evening we had a review meeting with was attended by Mr. Amol, Ravi and Saran. In the meeting I was asked to explain what was the progress of the work given to me for the week.

Week 2:

The fourth task given to me was by Mr. Saran, task was to research and find ways to make the given data stationary. I finished researching about it and found many ways for example first order differencing, transforming into log space. I was also given 2020 and 2021 data which I proceeded to clean.

I was offered to work on ANPR by Mr. Ravi, I accepted the offer and started to research and learn about ways to recognize text from a given image. After researching I found there are two major approaches, first is character segmentation and train a character segmentation model to recognize them or second to use approach similar to CRNN. After some testing I reached to

the conclusion that character segmentation is not very dependable, thus started to work on CRNN. The training was done on MJSynth90 dataset. The first implementation was on Pytorch. Pytorch implementation was a failure as there is an issue with CTCloss function in Pytorch. I tried reimplementing the same on tensorflow, this time we were able to train the model successfully. After testing the model the accuracy was around 65% which was not good. After further researching I found many better models like ASTER, MASTER, AbiNet, NRTR, SAR, SVTR-base. Based on the performance of these models I decided to use NRTR, SAR and SVTR-base into a single model. Finetuning on the pretrained weights for these models, after which I got an accuracy of about 90 to 93 percent. This was good enough for our purpose.

Week 3

The fifth task given to me to use the cleaned and stationary data to try out various models like ARIMA, SARIMAX, and any other good model I could find. I tried for ARIMA and SARIMAX, but accuracy not that great.

I started to work on image segmentation of the license plate to pass them into text recognizer. The work was successful.

I started a deep literature survey for License plate to use for postfixing the predictions. The literature survey was useful, I was successfully able to make an error rectifier for the prediction so we can maximize the accuracy of the license plate prediction.

I started to work on pipeline for whole process of license plate segmentation and then getting final prediction from the segmented images with error correction. I finished it successfully by the end of the week.

At the end of week we had a meeting, in the meeting after discussing with Mr. Saran I decided that I will not be working on demand prediction anymore as it was almost done and there was nothing I could do at this stage to contribute and I would be a better use of time to work on something new.

Week 4

We went for a site survey, on inspecting the site we decided we would need two cameras and some way to decide on which camera to use. I was given an idea of weight-based activation on cameras, which would save energy and prevent overheating of the cameras.

I stated working on the weight-based activation. The work we successful. Later I started to work on a solution for camera selection. The solution I came up with was for the operator to input the camera number, reasoning being the operator will always be present on the booth when a truck is being weighed. An other idea was to use Yolov5 model to detect the front of the truck using the two cameras but it is not necessary at the moment.

We conducted a bit of testing on live cars with yellow license plate. The predictor was working very well.

We compared the results with simple character segmentation model that was built before, the new model performed much better than it.

I was given the code for the final pipeline so I could clean and optimized it. I was successfully able to clean it and optimize it by removing unnecessary code and previous model that was being used.

The model pipeline was given back to Mr. Ravi so he could implement in on cloud. I have finished all that is possible for ANPR.

I asked to permission to Mr. Amol for joining oral pre-cancer detection. I was accepted.

Week 5 and 6

I did literature survey of oral pre-cancer. I was given the data of oral pre-cancer. The data is very small in size, so I did some data augmentations to increase the size from almost 90 images to 250 images.

I started researching various detection models. After shortlisting we settled for faster RCNN (with Efficientnet as backbone) and Yolov5.

Most of this weeks' time was spent on researching and testing various models. I had tested more than 15 models. From testing we inferred that a model that is shallow, was not able to perform well as it lacks capabilities to extract the necessary features and a model that was deep was not training much as we don't have large amount of data.

Week 7 and 8

We tested various variants of the Efficientnet backbone of faster RCNN. We inferred that the B0 variant is good but a bit lacking (i.e not detecting precancer in some of the some of the test images while detecting it correctly in rest.), B1 variant was not performing well and thus the optimal model must be in between these two.

I and Mr. Amol had a small meeting regarding which direction we should move forward with the project. We decided to research and build our own custom backbone for faster RCNN using Efficientnet B0 variant as a starting point.

Week 9

We determined that the problem might be the size of our dataset which is just 89 images, so I decided to build an Image augmentation tool which will increase the dataset by 10 images per image. The process was successful and I managed to make it.