

## **CS410 – Technology review**

### **Use of Tensor Flow in the patient healthcare journey**

#### **Introduction:**

Google built TensorFlow to bring machine learning capabilities to everyone. This paper aspires to shed some light as to how TensorFlow could be used to determine patient healthcare journey right from the first encounter in the hospital using its deep learning ability. A lot of medium to high-risk patients turn up to the hospitals around the world with a lot of stress, anxiety and what not. This paper intends to bring up the concept of foresight into the patient's healthcare.

#### **TensorFlow advantages:**

TensorFlow 2.0, with Keras makes building, training, and validation of model easier than the previous version. The TensorFlow model could also be deployed to production in any platform. The powerful research platform which TensorFlow provides, has been a great tool for many different industries and healthcare is no exception. One living example is the strides which Imaging technology has taken with GE Healthcare's Intelligent Scanning using Deep Learning for [MRI](#). TensorFlow has also been successfully used to detect disease classification and segmentation on retinal image OCT images. The 3 disease types namely Choroidal neovascularization, vitreous warts, or diabetic retinal edema.

#### **Problem statement:**

The current problem statement is, not one but several. When a high health risk patient gets admitted to a hospital, several tests are run comprising of blood works, Imaging etc. Sometimes the patient must run around different providers to get second opinion and has to go over the same tests again, at the end of which the patient might get a satisfactory clarity as what is going on with him/her or not. Not to mention, the operators and techs who operate the machines like X-Rays, CT Scans and the MRI's might read and interpret the results differently and that might

impact the physician's analysis. But unfortunately, the disease is becoming worse with every passing day and time is the luxury which high risk patients don't have.

Currently, with the advent of machine learning and AI, we have made huge strides in the medical science and we are able to intelligently scan with the help of deep learning, predict health conditions using blood work reports, we are also able to intelligently predict the chances of readmission etc., but we are not able to combine them together. We have not been able to collate different facets of healthcare indices to get a better judgement. We do have doctors to do that but again there is still that margin of error, which is why patients do opt for second opinion.

### **Solution:**

What I am proposing is making a robust patient health journey model by creating Convolutional Neural Networks to analyze enormous health EMR / EHR records considering all the health check outcomes like the medical history from previous hospitalizations, blood works, images, readmissions data, BMI data. What happened during each hospital admission could also be taken into account and before the provider even takes a look at the patient, he /she should have all the predictions and suggestions from the precomputed models plus the new predictions from the data analysis. The models are continuously trained which makes them better every day with reference to the sensitivity associated, i.e. even the slightest change results in an appropriate prediction delta and the patient can be advised accordingly. TensorFlow could prove to be a very important resource for this because of its ability to support 2D and 3D Convolutional Neural Networks (CNN), which is the primary requirement for medical image volume processing. Similar concept could be used to add further dimensions to the network which will make it n-dimensional with n number of health dimensions added to the vector. So basically, the more dimensions we add to the basic model, the more holistic the prediction. One dimension could be the annotations which doctors/ physician's prognosis for various kinds of illness of various age groups as well as for various

types of ethnicities. Another vital source of knowledge left untapped is the free hand clinical notes, which can give a lot of insight into the overall patient health condition. This data when combined with all the other vectors can result in better trained models.

## **Conclusion:**

The purpose of this paper is not to step into the territory of the physicians or doctors or to anyway replace them but to help them decide better for the benefit of the patient whose life is at risk. This way, the doctors have the access to the expert doctors advice /suggestions /comments etc via the precomputed computed models and total reaction time will decrease to a great extent which means the patient in question will get optimal care and guidance in the least amount of time.

## **References:**

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