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Deep Learning Method to Categorize Attack Patterns for DBI (Deep Brain Implants)

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ABSTRACT--*DBS stands for Deep Brain Stimulators are used to treat disorders related neurology in patients by using electrical stimulation. Parkinson disease is treated with such devices. The major issue to be focused is security as it deals straightly with the human body's emotion as well as physical state. If unattended this may even lead to death of a human. Fake stimulation can be used in human brain to act as an adversary by changing even the emotions of a person. The various attack stimulations can be predicted using a deep learning method in DBS. LSTM (Long* ***Short*** *Term Memory) is used in the proposed system to forecast tremor velocity. The proposed system also identifies stimulations that are genuine. Various attacks were emulated and the proposed system also notifies the patient about the attack.*

Keywords-- *Deep Brain Stimulators, Deep Learning, Implants, Neural Network.*

I. INTRODUCTION

In case of patients, electrical stimulation is used to tweak both neurological as well as sensory system. DBS stands for Deep Brain Stimulators which were used to treat patients with severe issues. Parkinson's disease was treated by using DBS is a gadget which actually looks like a pacemaker and has attained recent attention in world market. The patient is able to on or off the device with the help of a controller and they can also customize the voltage. Disorders related to movement can also be treated in the same way.

Despite of several advantages of DBS, it also suffers from certain limitations. The main issue prevalent in DBS is security. The issue is related to training the doctors as well as medical attendants and creating awareness among patients also. Implants related to brain are also subjected to hacking. The main reason behind this is the lower costs of DBS. Suppose a terrorist hacks politicians mind or mails, what happens is due to hacking.

The proposed method for tuning of brain we make use of its own replica. The replica is a biological model inspired by neural network. Deep learning method is used where the neural network consisting of several neurons transfer message between one another. Several attack patterns are studies to know the robustness of the system. The paper is organized as follows: Section 2 presents the literature review. Section 3 presents the proposed system, Section 4 discuss the results and Section 5 concludes the paper

II. LITERATURE REVIEW

Certain wireless medical devices have ability to transfer data. Attackers may try to hack the information so the data of patient is at risk now. As an example, an attacker can hear the transmission of radio signals and can access

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their data privately. This is mainly to steal information about the patient. There are several types of attacks tried including the repetition of operations as well as commands that aid on creating transmission of radio signals.

The security problems can be addressed by several solutions based on bio-metric, distance, and so on. Even though several solutions are available all of them suffer from several limitations. Attack based model is designed in the proposed method and analyzed against several attacks.

III. PROPOSED SYSTEM

The scientific community has attention in the fields like computer science, mechanical, agriculture. The Bio-inspired systems takes concepts from biology, it takes domain such as intrusion prevention, other domains like body and brain operation. Biologically it is inspired and hence it is considered as strong in comparing with other systems .By the observation from the existing models it requires replacement ,regular updating, and nourishing and the bio inspired models maintain themselves and learn even in changing conditions. In order to resolve different challenges, the engineers and the scientist were engaged in different innovative design architecture. The machines can be repaired themselves in the coming up future generations, over like skin gets repaired itself after the injury. In the coming up future the engineering mainly depends on developing flexible and self healing bio-inspired models. A Bio-inspired model i.e Deep learning is the special branch of machine learning which is used to understand the inbuilt patterns .By the help of activation function the neural network training can be able to calibrate weights and input data and the neural network training is comprised by the Deep learning model. In this paper, we use the recurrent neural network it permits the information to persist .

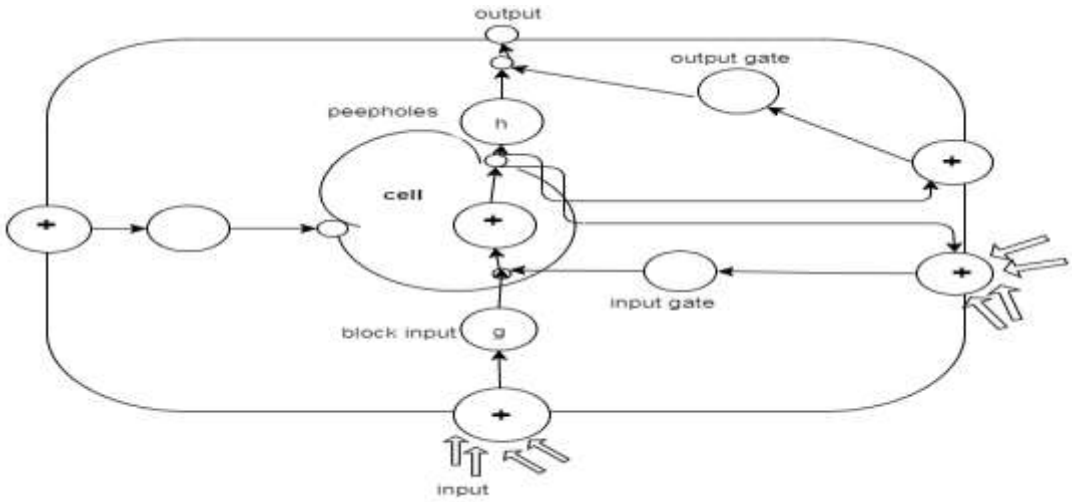

Fig.1. Proposed System

IV. RESULTS AND DISCUSSION

The aim of this project is to distinguish gliomas which are the most difficult brain tumors to be detected with deep learning algorithms. Because, for a skilled radiologist, analysis of multimodal MRI scans can take up to 20 minutes and therefore, making this process automatic is obviously useful. When we give the input as MRI scan

image of the patient testing and send to the system. It will take as input as image and applying all implementation steps and trained the model and data and create the ground truth and apply the trained model and finally predicted the output.

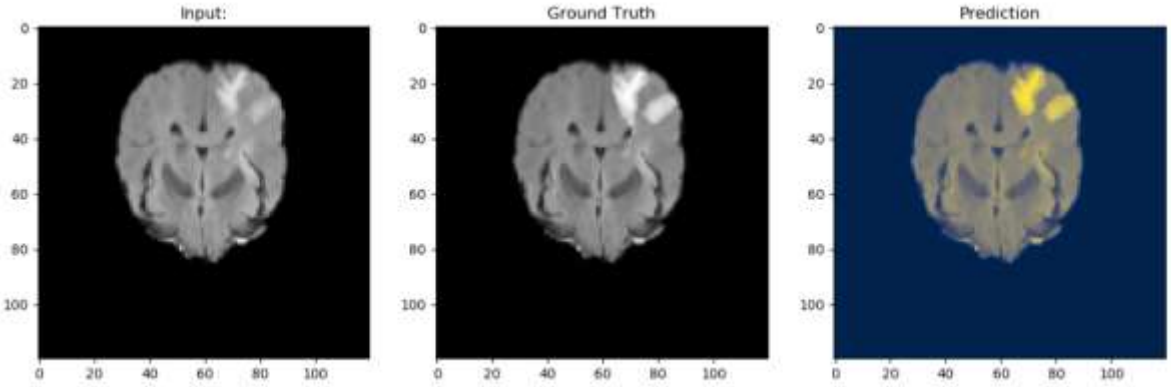

Fig.2 Results Obtained

V. CONCLUSION

Disorders related to neurology can be treated by giving stimulations inside the brain of patients which is done by the device used in medical field named as DBS (Deep Brain Stimulators). Inspite of several advantages of the device, certain security problems do exist. The main notable feature to be given importance is security as we deal with many patients. In order to predict the pattern of DBS, LSTM (Long Short Term Memory) is focused to study the disorders related to neurology in patients. Several values were used to train and also different attack patterns were used to understand the strength of the system. The loss values were less and time to train the datasets also got reduced. Parameters such as accuracy and reliability are checked to know the efficiency of the system.

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