How Close are Artificial Neural Networks to the Brain?

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Motivation

Artificial Neural Networks (**ANNs**) are modelled after the structure of **Brain** in hope of getting closure to do things in the way how our brain does and hoping it to give a good set of results on tasks which brain performs well. Keeping this in mind several variants of ANNs were proposed in past many of them performing extremely well in some of their specific domains. In doing so, when we move closer towards accuracy and optimization we get deviated from how our brain functions and vice versa. Creating a basic question about **"How Close are ANNs to the Brain"**, without compromising its efficiency!

Task Description

To answer this question we will try to do practical as well as theoretical analysis of different variants of **ANNs**. For the purpose of the same we had narrowed down to use following four models of ANNs:

- **LSTM** (Long Short-Term Memory)
- **GRU** (Gated Recurrent Unit)
- **CNNs** (Convolutional Neural Networks)
- **SNNs** (Spiking NNs)

We have selected these because of their prominence in their respective field. CNNs had shown remarkable performance in the field where **Vision** systems are involved while LSTM and GRU had performed really well in the field of **Natural Language Processing**. SNNs have helped really well in understanding the **Biological Neural Circuits** but had not really become prominent with application perspective.

After the analysis part, we will try to work on improvement which can use one or more of the existing model to move closer to our target. Also, we would try to build our model from scratch as that can provide much more fundamental understanding and can aid us in improvement part as well!

Datasets

Many datasets are available publicly, we had selected the following two, **MNIST** and **IMDb** datasets since both RNNs and CNNs model can be used for these after some preprocessing.