



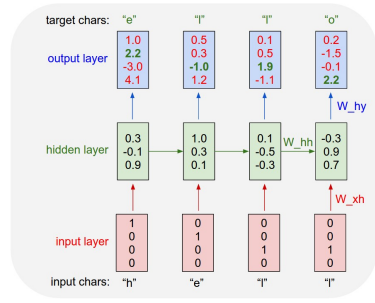
The Lorry I. Lokey Interdisciplinary Center  
for Life Sciences and Engineering

NETWORK BIOLOGY RESEARCH LABORATORIES

## Natural Language Processing with Biological Neural Network

### Background

Understanding language requires **memory**. How are the memories being stored in the brain? Nobody really knows.....Brain consists of **neurons** connected by **synapses**. **Neural network with plastic synapse** is supposed to be biological substrate for memory. **Artificial Neural Networks** are used to solve engineering tasks in the way that brain does. They have recently become a popular tool for a variety of Language related tasks. Could we develop better artificial neural network for language by incorporating more biological like memory?



### Project Goals

We will create an Artificial Neural Network with an advanced synaptic model and see how it improves the memory capabilities and helps us engineering a better Natural Language Processing (NLP) system.

### The Main Technique

We will start from existing Python code for training a Neural Network for some NLP task. Next we will introduce a "dynamical" synapse and see if we can do these tasks better.

### Prerequisites

- Python programming skills
- Interest in Deep Learning, Natural Language Processing and some Biology

### Literature

LeCun, Yann, Yoshua Bengio, and Geoffrey Hinton. "Deep learning." *Nature* 521.7553 (2015): 436-444.

Mongillo, Gianluigi, Omri Barak, and Misha Tsodyks. "Synaptic theory of working memory." *Science* 319.5869 (2008): 1543-1546.

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