Course Project

Almost Finished

September 30, 2011

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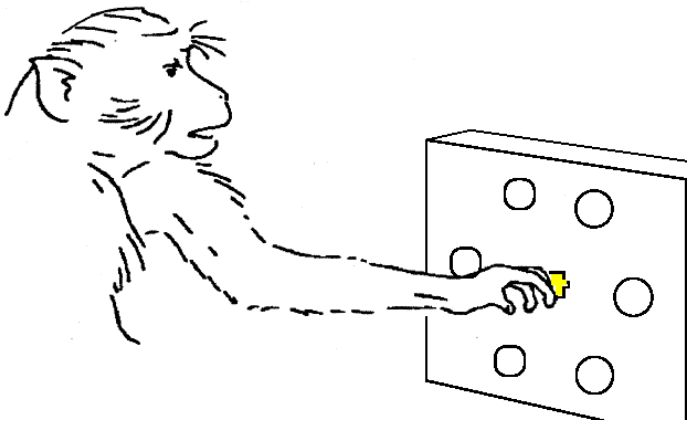
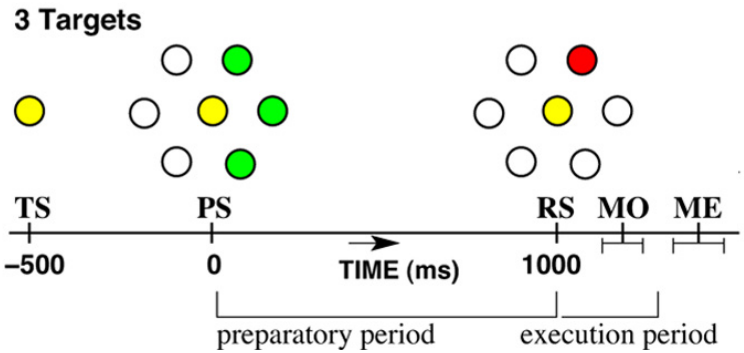
Experimental Procedure





- Data by peak SNR
- Movement onset: $t_{MO} = 0$
- Time resolution: 1ms

Rickert J, Riehle A, Aertsen A, Rotter S, Nawrot MP (2009) Dynamic encoding of movement direction in motor cortical neurons Journal of Neuroscience 29: 13870-13882

- General discussion of neural network and synaptic weight update rule
- Splitting to two groups
  - Group 1: Visualization of the data and the network output
  - Group 2: Implementation of the neural network and weight update rules

Neuron 1

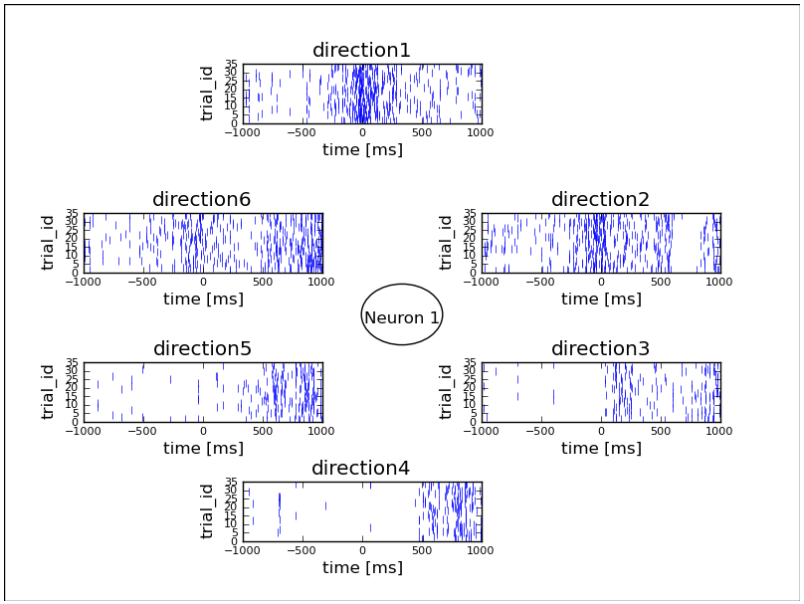


Figure: Spike trains against different trials

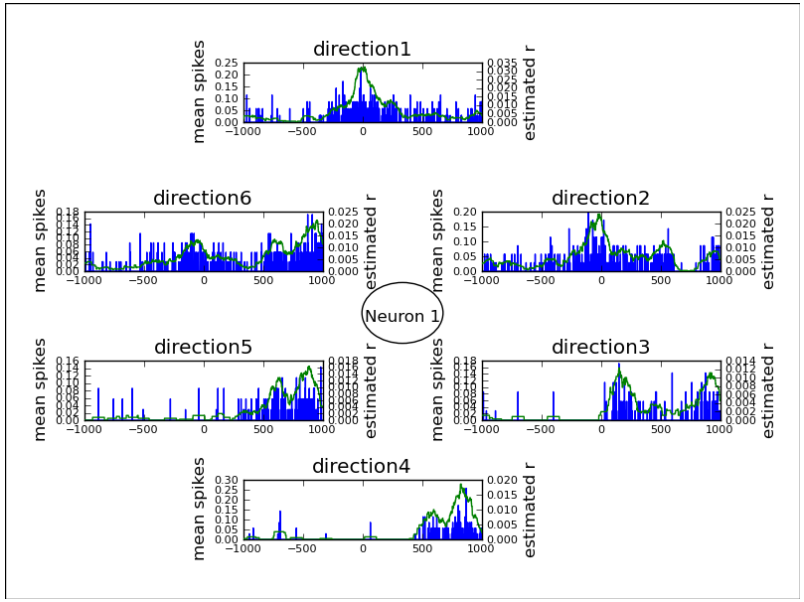


Figure: Mean Number of Spikes & Estimated Firing Rate

Neuron 2

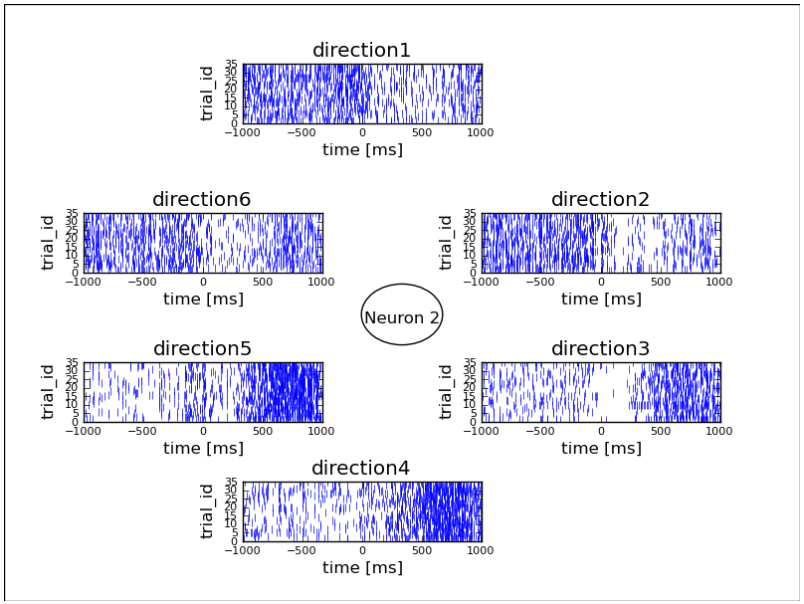


Figure: Spike trains against different trials

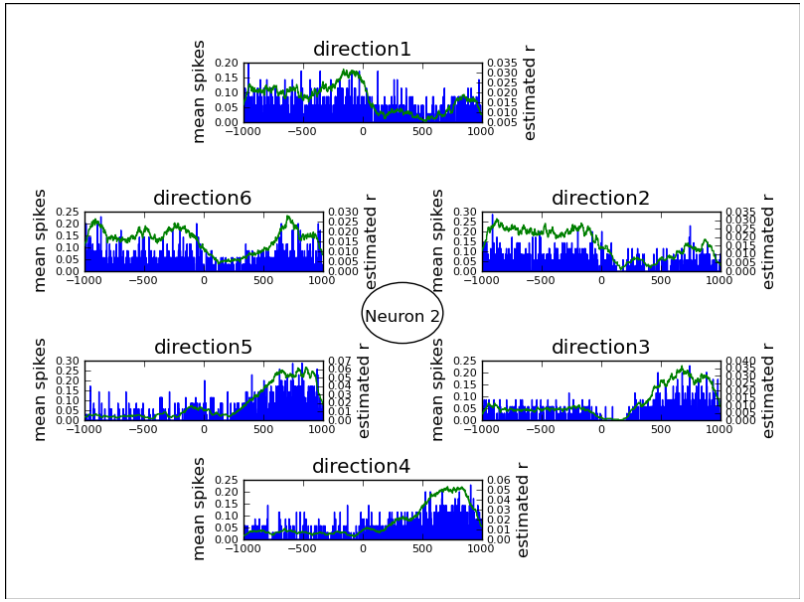


Figure: Mean Number of Spikes & Estimated Firing Rate

Neuron 3

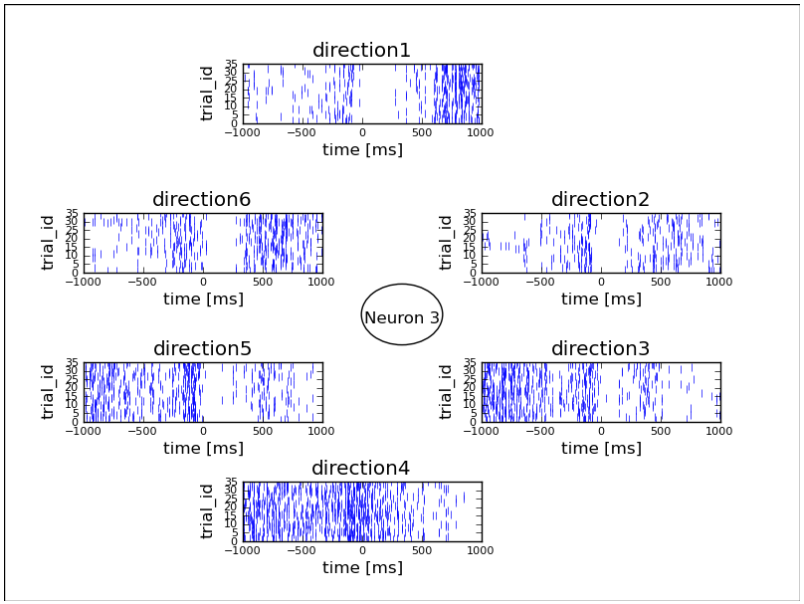


Figure: Spike trains against different trials

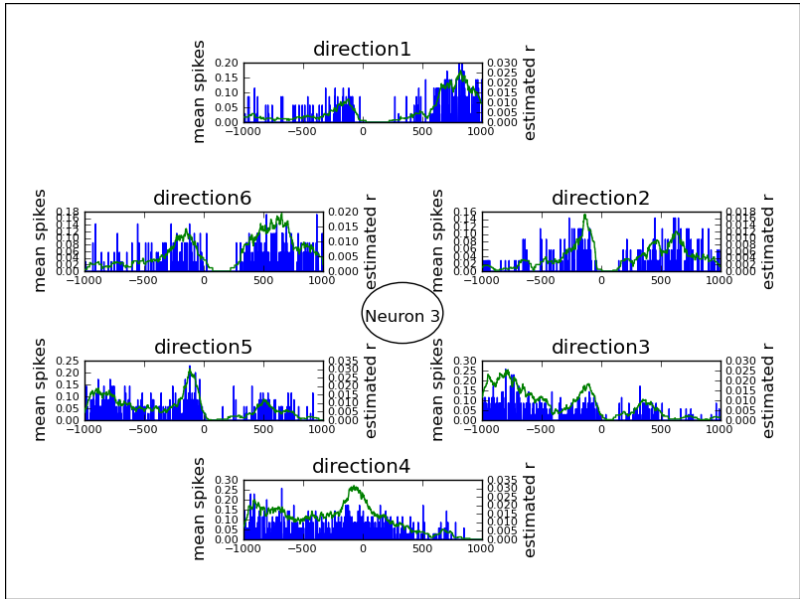


Figure: Mean Number of Spikes & Estimated Firing Rate

Neuron 4

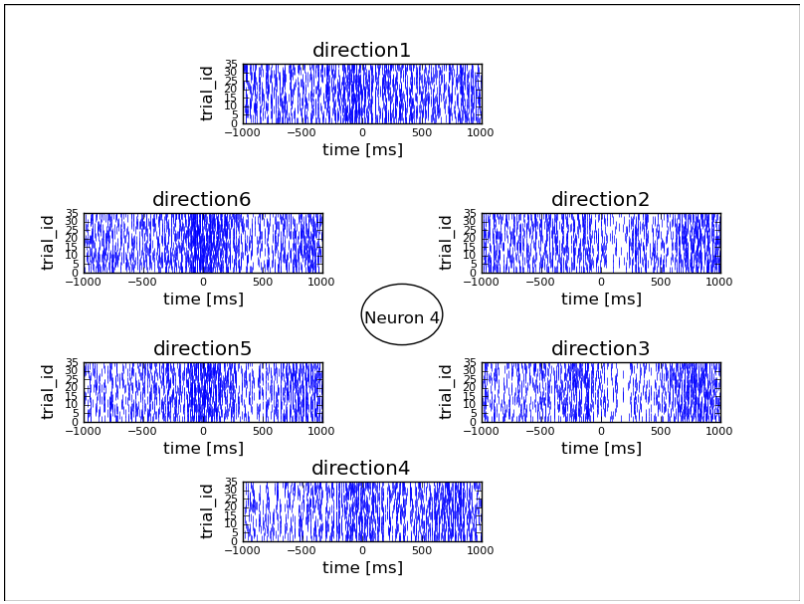


Figure: Spike trains against different trials

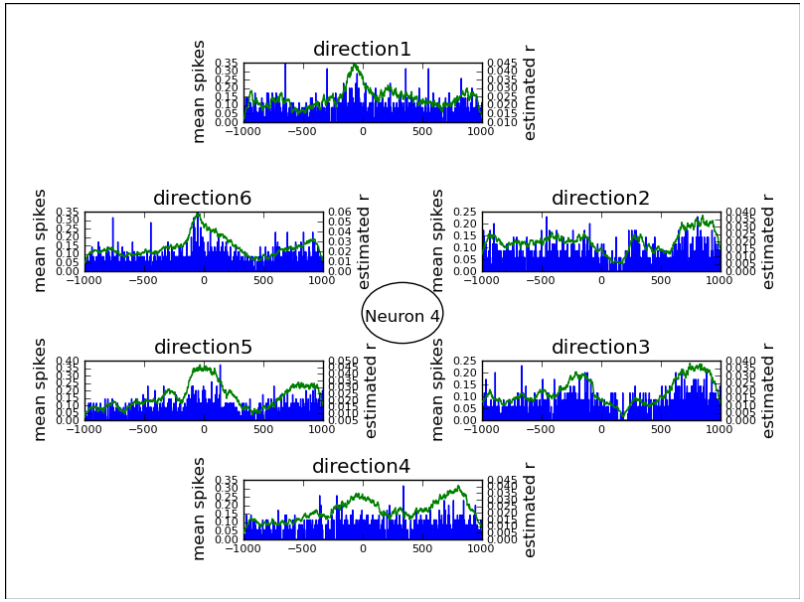


Figure: Mean Number of Spikes & Estimated Firing Rate

Neuron 5

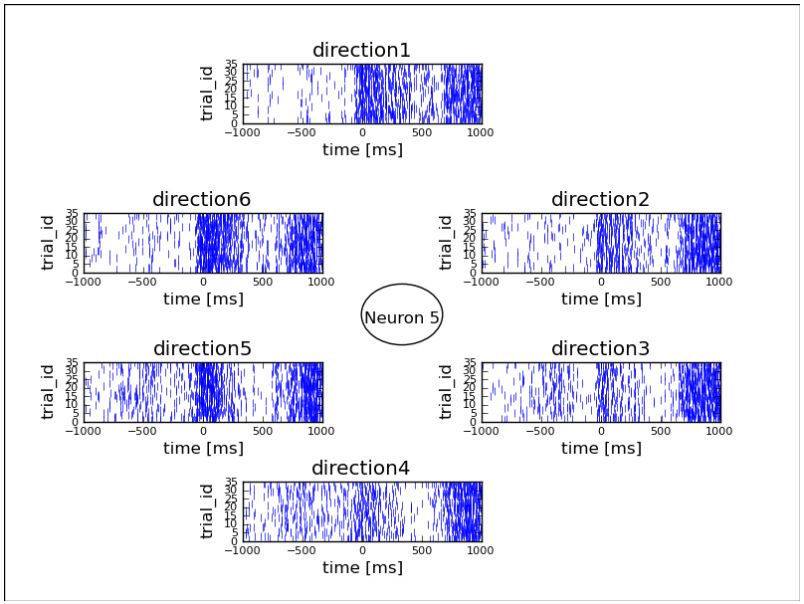


Figure: Spike trains against different trials

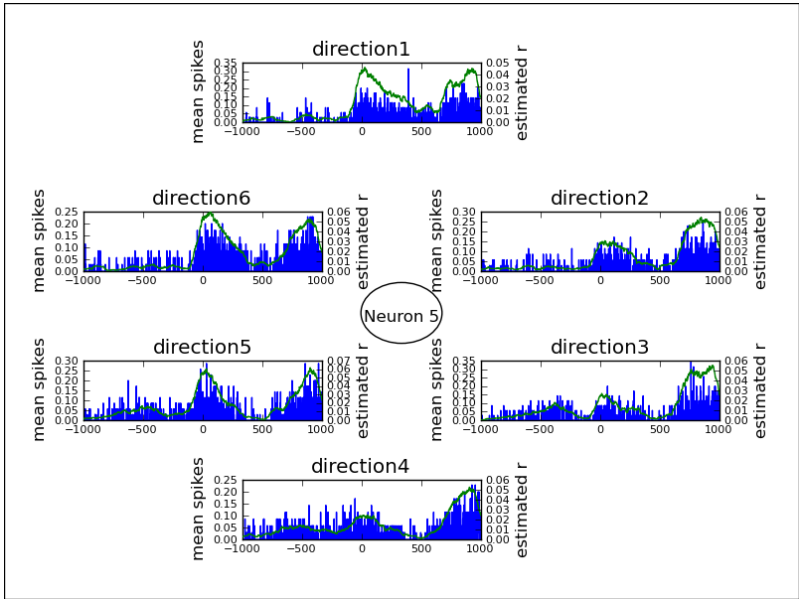


Figure: Mean Number of Spikes & Estimated Firing Rate

Realization of Neural Network

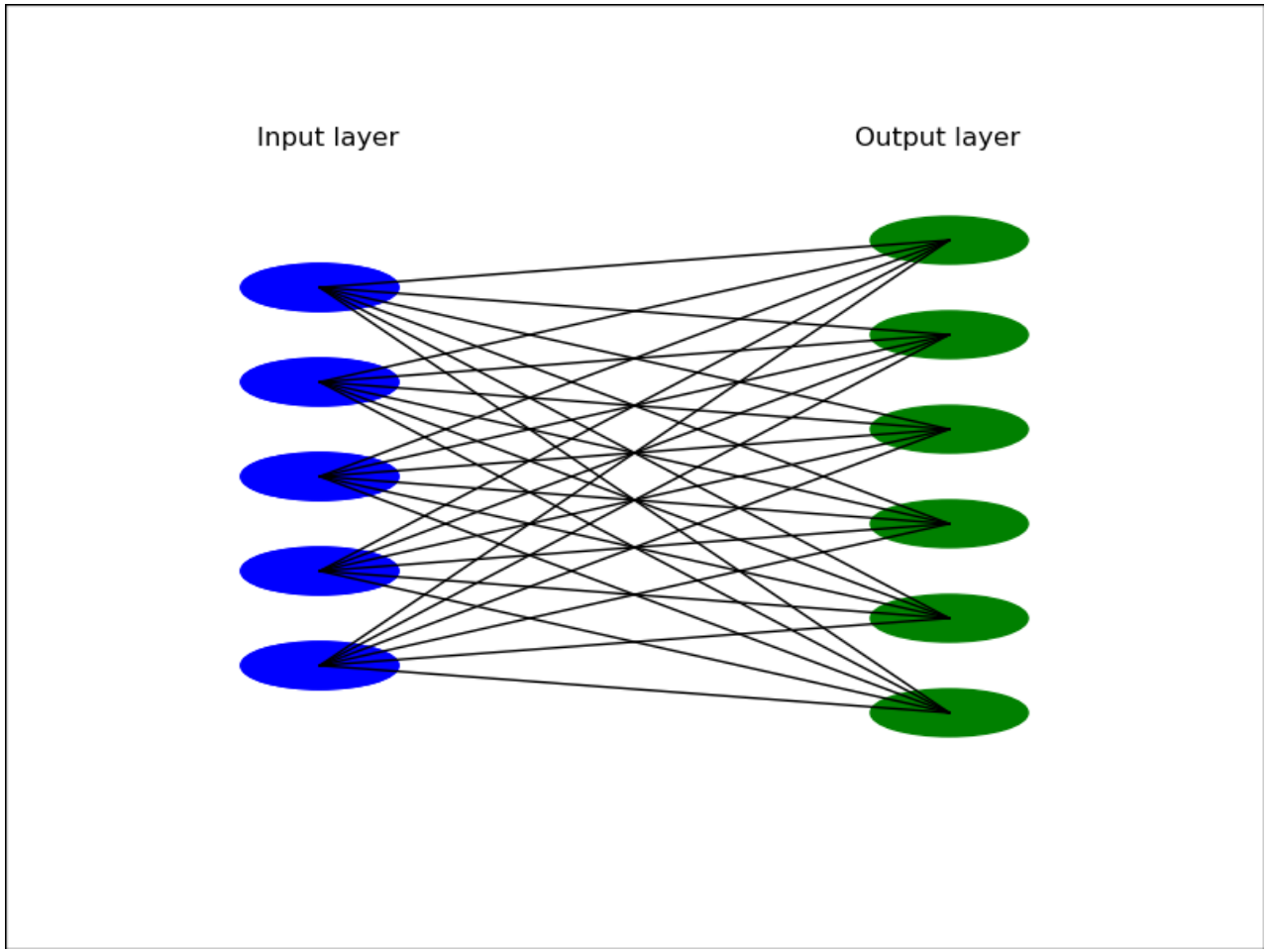


Figure: Network Description

Python code: update rule

```
for every trial:

    for every direction:

        - run the network
        - determine active synapses
        - update the weights:
            if the prediction was correct:
              - increase the active synapses
              - decrease the inactive synapses
            else:
              - decrease the active synapses
              - increase the inactive synpases


active synapses: higher firing rate than their average firing rate
```

Demonstration...

Closure

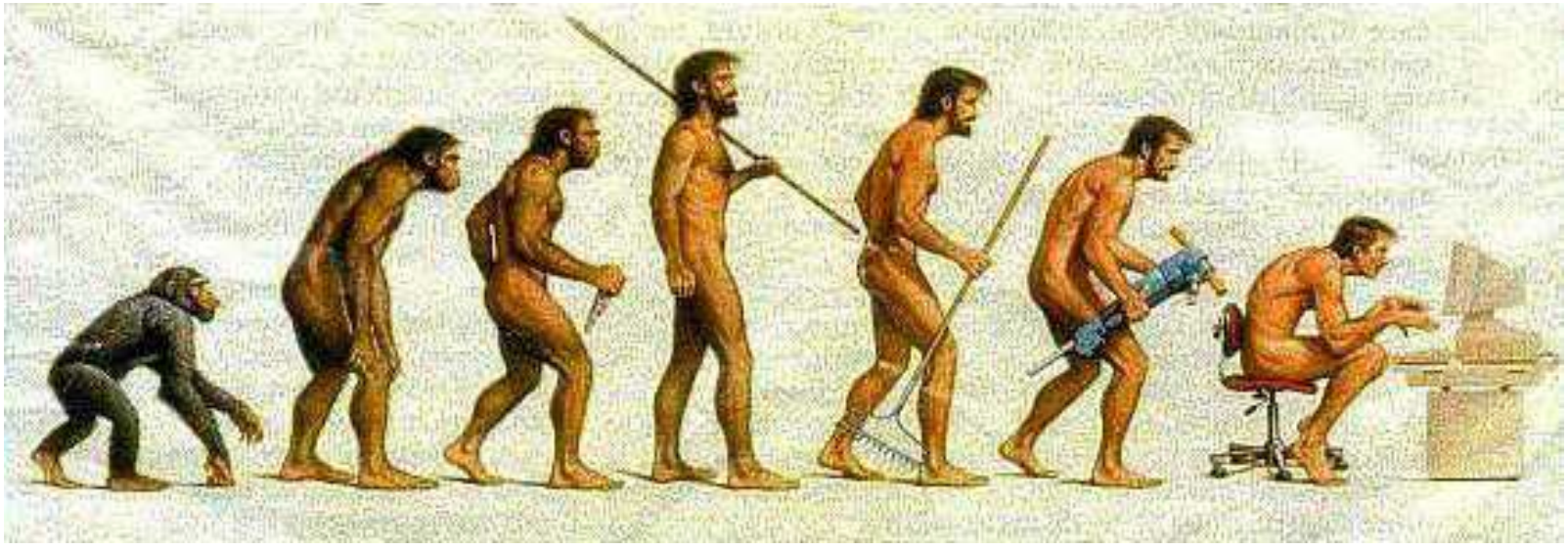


Figure: Last Day of Lecture