Group Project Minutes

Logged by: Ioannis Kasidakis

21 January 2015

Attendance

1. Juan Carlos Farah (JCF)
2. Christos Kaplanis (CK)
3. Erik Grabljevec (EG)
4. Panagiotis Almpouras (PA)
5. Ioannis Kasidakis (IK)
6. Zafeirios Fountas (ZF)
7. Pedro Martnez Mediano(PMM)

Summary

This meeting was mainly focused on discussing questions we had after reading all the relevant papers as well as what should be the next steps. A joint meeting took place after which, separate group meetings were conducted with each relevant supervisor to discuss in more detail about the specifics of the upcoming tasks.

Joint Meeting

Takeaway Points

1. The first report will be delivered on 6th February.
2. Stage 1 of the project needs to be finished by 13th February the latest.
3. Pattern recognition is estimated to take about 3 weeks.
4. With regards to the requirements of the project:
   (a) The worst-case and realistic scenario is to complete stages 1 and 2 with different levels of completion respectively.
   (b) The ideal scenario is to complete all 3 stages.
5. As discussed, dragonfly neurons will do the premature selection of the target but the proper selection will be done by us.

Action Points

1. We need to decide how many neurons we are going to use.
2. We need to decide how many inputs we are going to need.
3. We need to decide about the robustness of the patterns.

Dragonfly Neuron Meeting

Takeaway Points

1. According to the current ZF's neuron implementation, each neuron has shape similar to a polygon. Its dendrites are randomly formed in a biologically plausible way and the general morphology of the neuron is replicated by the paper *Local and large range inhibition in feature detection. DM Bolzon, K Nordstrm and DC O'Carroll*.
2. The first part is to translate the input from an event camera/webcam to an input which can be used by the neuron implementation. The stages for this part are:
   (a) Split the video of the event camera/webcam to separate frames.
   (b) Reduce the definition of the frames (probably to 32x32 pixels).
   (c) Convert the frames to grayscale pictures.
   (d) For each pixel and for each frame, find the difference in grayscale color with its next frame.
   (e) Each pixel will be considered to feed the results to a vision neuron.
   (f) Create random Poisson events with numpy in order to determine whether each pixel will result in the respective vision neuron to be fired.
   (g) Create a matrix/array for each pixel with 1s and 0s(1 if the neuron fired a spike, 0 otherwise).
   (h) Feed this input to the neuron model.
3. The second part is to decide about the structure of the model e.g the number of neurons we are going to use and the number of synapses.
4. After the completion of both parts, we are going to run tests in order to determine whether the model is accurate and possibly change any parameters if required. The aim is to create a model which can ideally replicate or at least approximate the experiment of the paper *Local and large range inhibition in feature detection. DM Bolzon, K Nordstrm and DC O'Carroll*.

Action Points

1. Search whether there is any Python library which can help with the implementation of the first part.
2. Start the implementation of the first part.

Action Selection Meeting

Takeaway Points

1. We can base our model on the two papers suggested by PMM (Masquelier et al.).
2. Input for our model will be similar from Figure 1 from first paper (Masquelier et al. 2008).
3. Will add noise to pattern to see how robust the model can be.

Action Points

1. Re-read papers and Computational Neurodynamics lecture notes by Monday 26 January 2015.
2. Replicate the code from first paper by Masquelier et al. thereafter.
   (a) Preliminary plots by 6 February 2015.
   (b) Final model by 13 February 2015.
3. Do not use Python's built-in random library, but NumPy's.
4. Use a seed in order to be able to replicate data.
5. Model STDP based on Professor Shanahan's code.