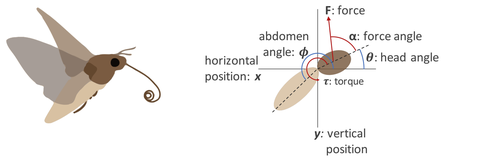
Neural Network Visualization

Zijian Li, Callin Switzer, Yue Zhao and Zhengde Zhao
University of Washington

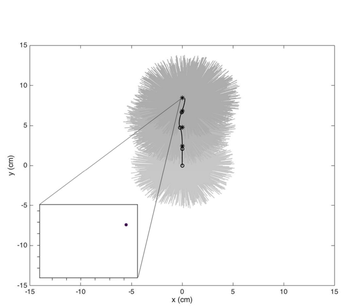
UNIVERSITY of WASHINGTON

Motivation

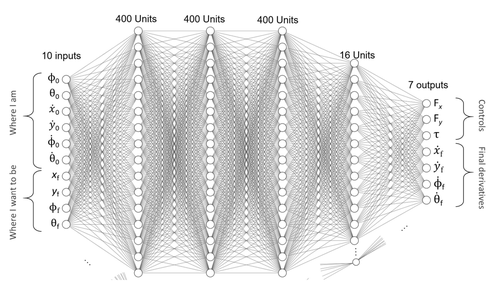
Learning a non-linear controller for insect flight dynamics with a deep neural network



Question: What is the temporal pattern of forces required to follow a complex trajectory? If I know where I am, and where I want to go, how do I get there?



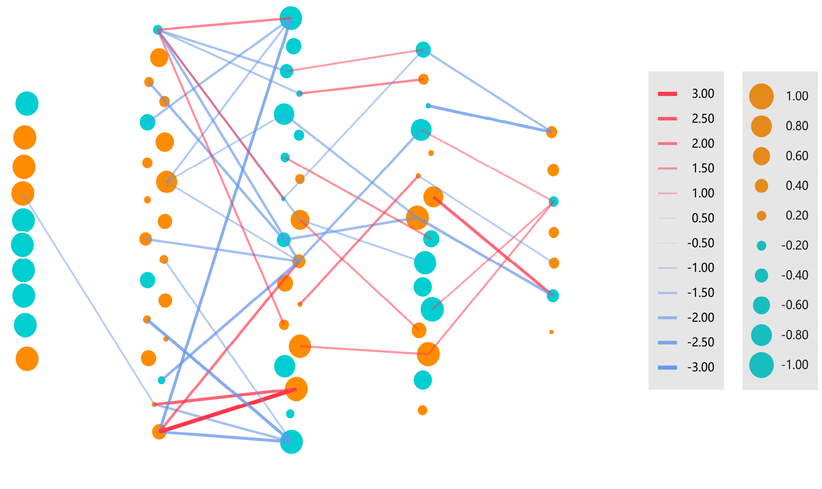
Answer: Deep learning + Model Predictive Control



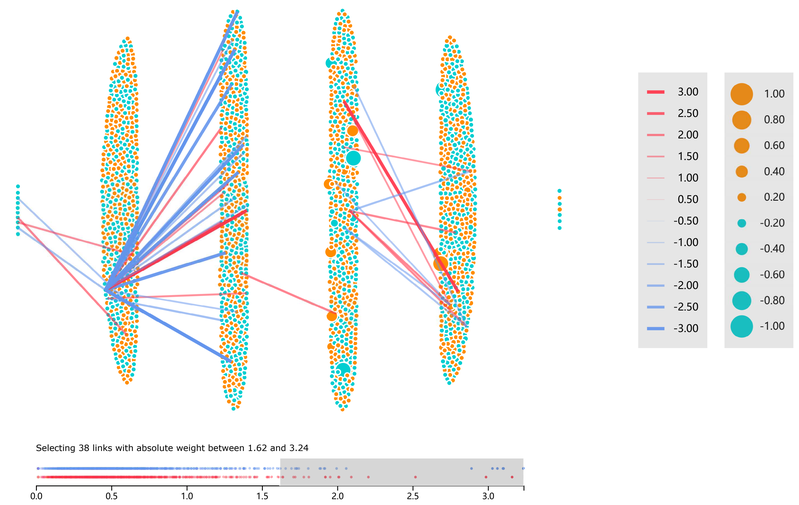
Goal: Visualize the "internal workings" of a feed forward neural network.

Visualizing neural network architecture

This is a nerual network with $\mathbf{3}$ hidden layers of size: $\mathbf{20,\ 20,\ 16}$.
The inputs are: $\phi_0 = \theta_0 = \dot{x}_0 = \dot{y}_0 = \dot{\phi}_0 = \dot{\theta}_0 = -0.5$ and $x_f = y_f = \phi_f = \theta_f = 0.5$.



This is a nerual network with $\mathbf{4}$ hidden layers of size: $\mathbf{512,\ 512,\ 512,\ 512}$.
The inputs are: $\phi_0 = \theta_0 = \dot{x}_0 = \dot{y}_0 = \dot{\phi}_0 = \dot{\theta}_0 = x_f = y_f = \phi_f = \theta_f = 0$.



Interaction techniques

- The nodes can be dragged to re-position.
- Dropdown menu that allows to choose different neural network.
- Sliders that allow to choose values for each input variable.
- The brush allows to choose the range of the weight (in absolute value) to be shown.
- When hover on the nodes or links, the details will show up.

Improvements

- Hide all "dead" nodes
- For any node, show the strongest path.