

CCM Project Proposal

Paz, Peter, Qixiu

Topic: Semantic degradation

Model: Neural Network

We are interested in investigating degradation in semantic cognition. In lecture, we briefly learned about adding noise to a neural network to mimic dementia in human cognition (Lecture 2 Slide 69). Our first step will be to implement noise in the Quillian's hierarchical propositional model. The next step will be to explore whether adding noise to different layers of the network produces similar dementia behavior or not.

Our literature search will be focused on neural network models, semantic degradation, and human dementia. We are planning to use the same dataset from the homework, so we can later compare the performance. If time allows, we will expand the model from McClelland paper to a new/larger domain.

Notes

- Observe how introducing noise can affect the specification of attributes and potentially link it to real cases/results of dementia.
- We can see how adding noise to different layers of the network
 - (i.e. input and hidden) can affect the learning outcome.
 - add noise to the weights, in addition to the activations.
 - can also try removing weights
- We can experiment with removing/dropping nodes in the network.
 - a common technique called “dropout” used when training neural networks.
 - <http://www.jmlr.org/papers/volume15/nandan14a/nandan14a.pdf>
 - If you train with dropouts, it's usually a good thing and can lead to better generalization
 - if you add it just at testing, it produces disruption (which is what we want)
- Literature review
 - [Dementia paper](#): more of a general literature
 - [McClelland, J. L., & Rogers, T. T. \(2003\). The parallel distributed processing approach to semantic cognition. Nature Reviews Neuroscience, 4\(4\), 310.](#)
 - [Sentence comprehension](#)
 - Book reference by Brenden: <https://mitpress.mit.edu/books/semantic-cognition>
 - similar issues with a different architecture:
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.893.9668&rep=rep1&type=pdf>