

## Neural Network and Machine Learning Research Ideas

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- ❖ Creating systems that don't need as much training data to be effective.
  - One shot and zero shot learning.
- ❖ Networks that have specialized memory units that hold specific past data points and their labels.
  - Neural Turing Machine and Differentiable Neural Computer have external memories.
- ❖ Determining the actually useful things that GANs can do.
  - Generating synthetic data
  - Usage as a feature extractor to understand more about your data's distribution in an unsupervised learning setting (specifically one where you have a lot of unlabeled data), and then using those features for a different supervised learning task.
- ❖ Creating models with less labeled training data using one shot learning, learning from unstructured data, weak labels,
- ❖ Making reinforcement learning algorithms better in environments with sparse reward signals.
- ❖ How to make computations faster on hardware? How to make memory storage and access faster? How does everything change when you try distributing the workload to lots of different servers?
- ❖ Multitask learning in order to have single networks that able to solve a bunch of different tasks given input, rather than having one (CNN) for image inputs and one (RNN) for language inputs.
  - The main thing here is that we'd like to be able to compute some shared representation of the input so that we're able to do some sort of analysis of it, regardless of whether the input is an image or text or speech, etc.
- ❖ Adding more variety to your loss function. A traditional loss function just represents the difference between a network's prediction and the true label, and our optimization procedure seeks to minimize that. We can also try to get creative with our loss functions and add soft constraints on the values of the weights (weight decay) or the values of the activations, or honestly whatever desirable property we want in our model.