



# Week 7

- Week to do list
  - ✓ fix all of the Mario Coding problem
  - ✓ read papers about hypernetworks

1. *This week the main work is to get the progress of code programming. Last week I have met many problem that are different from the original paper, so I got in touch with the authors to find help. Finally I solved this problem and implemented my own new idea, the result will be published around next week.*
2. *Then I read a overview of multi-task learning.*[\[1\]](#)

## Hyper Networks

[\[2\]](#) "Hypernetworks"

**Problem:** The author proposed an approach of using a small network (called a "hypernetwork") to generate the weights for a larger network (called a main network). Because of the non-shared weights, the main network may perform better. And the author solved the problem of a big matrix.

**Method:** The author proposed static hypernetworks and dynamic hypernetworks. Here I only introduce the part of static hypernetworks: convolutional networks. The majority of model parameters are in the kernels of convolutional layers. The hypernetwork is a two-layer linear network and the input is an embedding vector that describes the entire weights of a given layer. It is obvious that by using this approach, the whole parameters are reduced.

**Related Knowledge:** HyperNEAT, end to end training,

**Result:** Author's approach is trained end-to-end with gradient descent together with the main network, therefore are more efficient. Testing on CNN and LSTM and get SOTA performance.

## References

- [1] Yu Zhang and Qiang Yang. An overview of multi-task learning. *National Science Review*, 5(1):30–43, 2017.
- [2] David Ha, Andrew Dai, and Quoc V Le. Hypernetworks. *arXiv preprint arXiv:1609.09106*, 2016.