

Peer Review

# Review of: "Sample Compression Hypernetworks: From Generalization Bounds to Meta-Learning"

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## Summary:

This paper extends current generalization bounds found through compression theory to a new class of functions. This observation is used to inspire a new meta-learning framework that harnesses a dynamic reconstruction function. The support set is used to identify the best possible reconstruction functions on smaller subsets, which can then be applied to the various query sets.

## Strengths:

The paper provides a solid theoretical basis by extending current theory for generalization bounds with reconstruction functions.

The idea of learning the reconstruction function itself rather than treating it as fixed is interesting.

The paper provides preliminary experiments on synthetic data. This shows at least that the provided architecture and associated algorithm are sound.

## Weaknesses:

More analysis should be provided to justify and better understand the form of the new bound in Theorem 3. An additional term has been included, and the loss is now over expected loss rather than the losses themselves. Since this is a new form for error bounds including reconstruction functions, the implications need to be further explored.

In the paper, reconstruction functions are mainly described as constructs to obtain tighter generalization bounds. There is very limited detail on how they are applied in practice. That makes it harder to understand the potential of the new learnable reconstruction function.

The experiments lack comparison to current methods. The preliminary experiments merely show that the model does something. It's not very convincing alone.

## **Declarations**

**Potential competing interests:** No potential competing interests to declare.