

# High Capacity Neural Network

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# 1 Introduction

TODO(domenic): Write this section

# 2 Related Literature

TODO(domenic): Write this section

# 3 Model

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## 3.1 Forward Computation

A fully connected feedforward neural network was used with the only alteration being in the way inputs were transformed prior to being passed to the activation function.

$$\sum_i (w_i \cdot x_i + b_i) \tag{1}$$

$$\sum_i (w_i \cdot x_i + b_i)(r_i \cdot x_i + c_i) \tag{2}$$

Rather than using the standard linear weighted sum, (1), a quadratic weighted sum, (2) was used. This alteration is a superset of the standard design, which is apparent under the following conditions,  $r = 0$  and  $c = 1$ . Although this change is small, it enables the neural network to represent any bounded degree polynomial over an infinite domain using a finite number of nodes. While the standard design would require an infinite number of nodes to satisfy the same requirement.

## 3.2 Backward Computation

# 4 Experiments

TODO(domenic): Write this section

# 5 Conclusion

TODO(domenic): Write this section