NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

School of Computer Science and Engineering
College of Engineering

Deep Learning for Computer Chess

SCSE21- 0010

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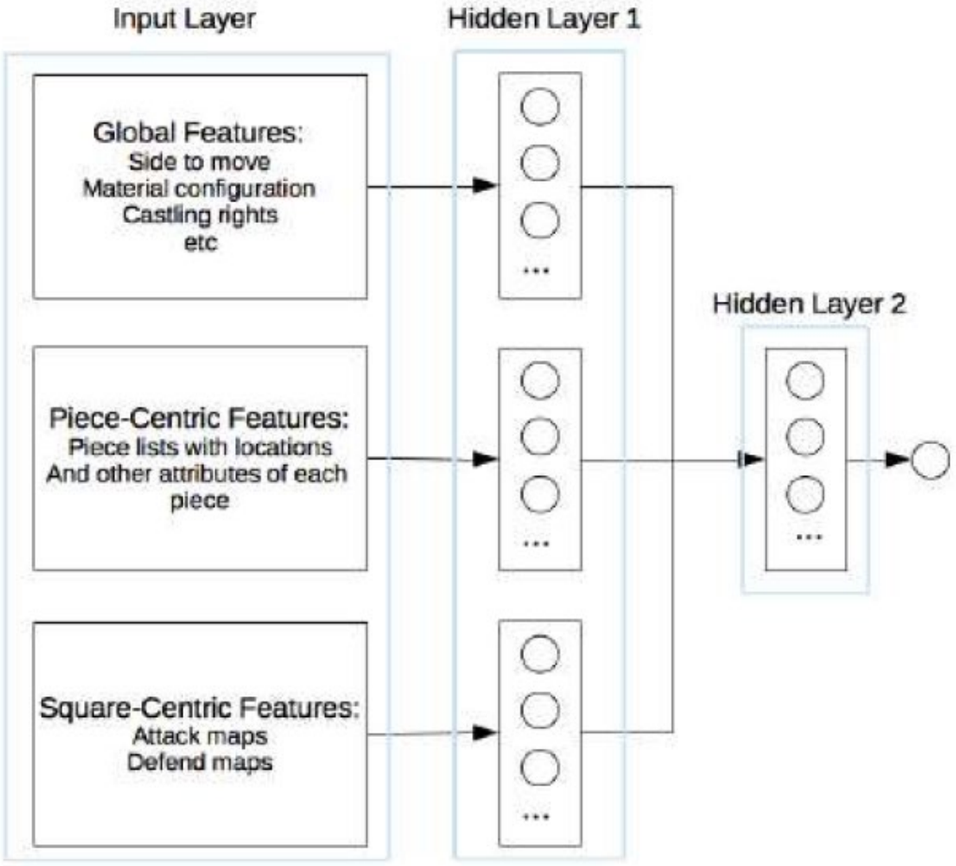
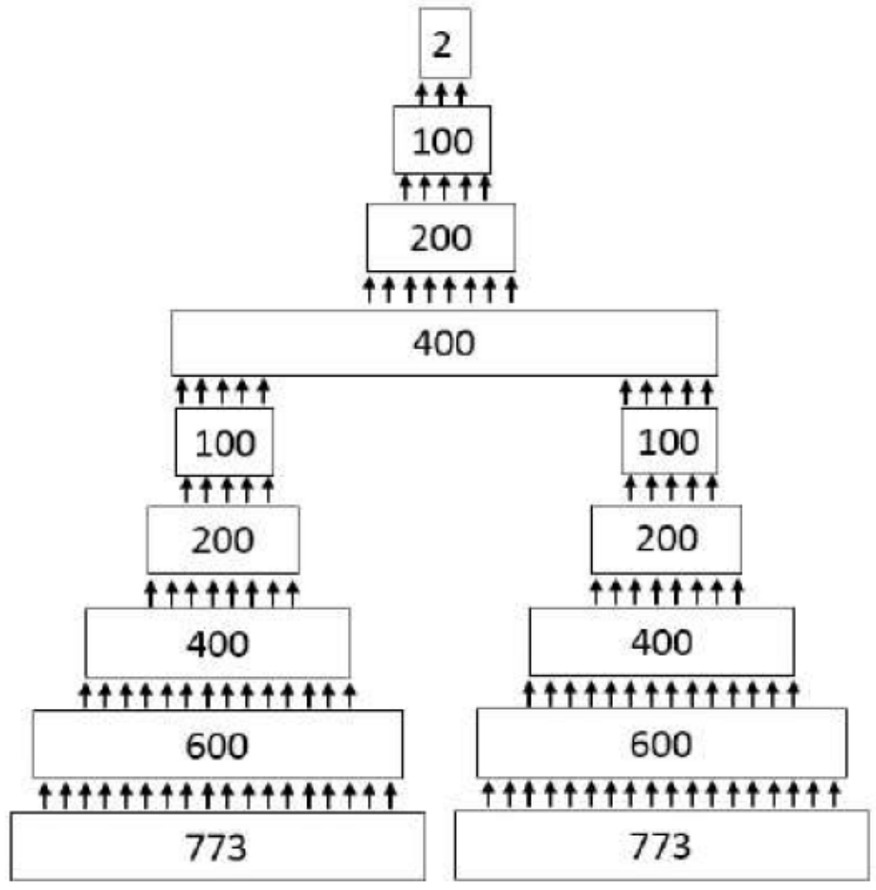


Giraffe Architecture, image courtesy of M. Lai et al. [1]



DeepChess Architecture, image courtesy of O.E. David et al. [2]

Project Objectives:

The aim of this project is to study state-of-the-art machine learning algorithms such as Matthew Lai's Giraffe and David Eli's DeepChess for evaluating chess positions. Deep neural networks are used in these algorithms to replace human intuition. Giraffe learns to play chess largely by self-play and derives its own rules based on the data [1]. Whereas DeepChess evaluates chess positions using a deep neural network without any a priori knowledge regarding the rules of chess [2].

Conclusion:

Giraffe achieves an accuracy of 66.4%. This method implements a unique feature extraction. This implementation is a great example of combining conventional and modern chess engines as it makes use of deep learning while still making use of a rule-based feature selection. An end-to-end implementation of DeepChess achieves an accuracy of 96%. This method stands out as a fully modern evaluation function because it evaluates chess positions using a deep neural network without any a priori knowledge regarding the rules of chess.

Model	Testing Accuracy
Best Giraffe Model	0.664
Best DeepChess Model	0.960

References:

[1] M. Lai, "Giraffe: Using deep reinforcement learning to play chess,"

[2] O. E. David, N. S. Netanyahu, and L. Wolf, "Deepchess: End-to-end deep neural network for automatic learning in chess,"