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Evolution of Artificial Neural Development

In Search of Learning Genes

Springer

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Acknowledgements/Dedication

I dedicate this work to my Supervisor and Teacher in Life, Dr. Julian Francis Miller. The ideas and work presented here is the reflection of his guidance and his thinking of True AI. The whole concept is a culmination of our continuous discussions and his views of what Artificial Intelligence should be doing. Without him building some developmental concepts were almost next to impossible. He guided me during my Ph.D. and helped me develop systems capable of learning for itself, or at least the concept of it. Through his guidance I learned the very basics of life itself. I learned about myself, what am I? How I was built? Where I am in my body? How a single cell transformed into what I am today? The group behaviour of my cells in body and brain. I learned it all from you Julian, you are a true science to me.

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Contents

Declaration

The work presented in this book is the author's own work, unless it is stated otherwise. The following items have been previously published during this research.

1. Khan, G. M., & Miller, J. F. (2014). In search of intelligence: evolving a developmental neuron capable of learning. *Connection Science, 26*(4), 297–333.
2. Khan, G. M., Miller, J. F., & Halliday, D. M. (2011). Evolution of cartesian genetic programs for development of learning neural architecture. *Evolutionary Computation, 19*(3), 469–523.
3. Khan, G. M., & Miller, J. F. (2011). The cgp developmental network. *Cartesian Genetic Programming*, 255–291.
4. Miller, J. F., & Khan, G. M. (2011). Where is the Brain inside the Brain? *Memetic Computing, 3*(3), 217–228.

Hypothesis

Is it possible to implement an autonomous computational system inspired by neuroscience capable of continuously learning and adapting in complex environments.