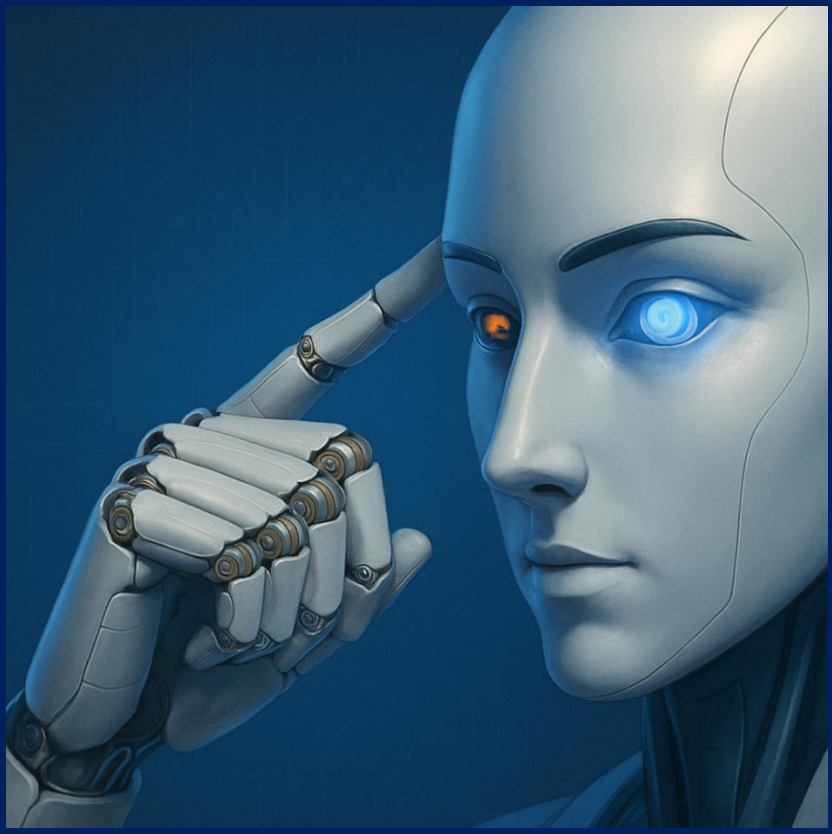
Machine Intelligence
Evolution and Implications



Mats Danielson

$$Loss = L_{w_b^b} + \frac{\lambda}{2n} \qquad \frac{1}{1+e^{-z}} = \sigma(z)$$

$$z^{[l]} = w^{[l]}\tilde{a}^{1} + b^{[l]} \qquad \frac{u}{u} = \frac{\tau}{\gamma} Loss$$

$$\frac{\partial J}{\partial w_j} = \frac{\partial J}{\partial^{[l]}} \qquad \sigma^{[l]} = \sigma(z)$$

$$\frac{\partial}{\partial z}\sigma(z) = \sigma(z)\left(1-\sigma(z)\right) \qquad L = \frac{J}{N}\sum_{i=1}^{N}\sum_{i=1}\left(y^{(x\dot{o})} - \tilde{y}(x^{[l]})\right)^2$$

$$L\left(\tilde{a}^{[l]}, y\right) = -\frac{1}{m}\left(\tilde{y}^{(i)}\right)\ln a + \left(1-\tilde{y}^{(i)}\right)\ln\left(1-\tilde{a}^{(i)}\right)$$

$$w_j^{[l]} = w_j - \alpha\,\nabla^{\gamma}\bar{w}_j\, J(w,b) \qquad \frac{\partial^{[l]}}{\partial^{[l]}} = \frac{d^{[l]}}{d^{\cdot 1}}$$

$$\partial^{[l]} = w_j \alpha \nabla J(w, b) \qquad \nabla_{\tilde{y}}\nabla \cdot \nabla_y \tilde{y}(x)$$

$$\vec{d}(i^{1})) = \frac{\partial L}{\partial z^{[l]}}\, g^{\prime}(z^{[l\,c)}) \qquad \nabla J\,(w,) = (x)\cdot\nabla(x)$$

$$\nabla \bar{J}(w,b) = 2\left(y(x) - \tilde{y}(x)\right)\cdot \nabla_y \tilde{y}(x)$$

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And then one day you find
Ten years have got behind you
No one told you when to run
You missed the starting gun

You run and you run
To catch up with the sun
But it's sinking
Racing around
To come up behind you again

The sun is the same
In a relative way
But you're older
Shorter of breath
And one day closer to death

– Roger Waters

This book is temporarily withdrawn because of negotiations for changing publishers.

About the Author

Mats Danielson is a Full Professor of Computer and Systems Sciences at Stockholm University. He also holds a UNESCO Chair Professorship in Higher Education within Computer Science and is a Senior Research Scholar at IIASA, the International Institute for Applied Systems Analysis in Vienna. He has previously served as Vice President of External Relations, Innovation and Information Technology and as Dean of the Faculty of Social Sciences at Stockholm University.

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Machine Intelligence – Evolution and Implications deals with the evolution of computer systems that in some sense seem to display intelligence that resembles that of humans. Such systems are developments within the broader area of artificial intelligence. The history goes back to the 1950s while dreams of thinking machines originate from much further back. The second part of the book discusses possible implications from the rapid advances of machine intelligence in terms of both opportunities and threats.

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