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Manuel Kroiss

Predicting the Lineage Choice of Hematopoietic Stem Cells

A Novel Approach Using Deep Neural Networks

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Series: BestMasters

• **Publication in the Field of Organic Chemistry**

Manuel Kroiss examines the differentiation of hematopoietic stem cells using machine learning methods. This work is based on experiments focusing on the lineage choice of CMPs, the progenitors of HSCs, which either become MEP or GMP cells. The author presents a novel approach to distinguish MEP from GMP cells using machine learning on morphology features extracted from bright field images. He tests the performance of different models and focuses on Recurrent Neural Networks with the latest advances from the field of deep learning. Two different improvements to recurrent networks were tested: Long Short Term Memory (LSTM) cells that are able to remember information over long periods of time, and dropout regularization to prevent overfitting. With his method, Manuel Kroiss considerably outperforms standard machine learning methods without time information like Random Forests and Support Vector Machines.

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