

Propositions

Deep Learning for Intracellular Particle Tracking and Motion Analysis

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1. Deep-learning based joint denoising and detection performs better at detection than single-task deep-learning particle detection (*Chapter 2 of this thesis*).
2. Deep-learning based particle tracking methods yield competitive results, with the great practical advantage that users do not have to tweak any parameters (*Chapter 3 of this thesis*).
3. For well-defined motion models, linking methods using explicitly defined, matching models may perform better than deep-learning based methods (*Chapter 3 of this thesis*).
4. A more sophisticated network design, such as a denoising autoencoder, improves the accuracy and robustness of particle tracking (*Chapter 4 of this thesis*).
5. End-to-end fully automated quantitative tools are necessary for analyzing large volume and high information content of fluorescence microscopy images (*Chapter 5 of this thesis*).
6. Deep learning provides not only new possibilities but also new restrictions.
7. To achieve the possible, we must attempt the impossible again and again (*Hermann Hesse*).
8. The goal of any PhD program should be a scientifically trained individual, not a thesis.
9. Mastering others is strength, mastering yourself is true power (*Lao Tzu*).
10. Learn to make good use of fragmented time, not to fragment time.
11. Whatever good or bad fortune may come our way, we can always give it meaning and transform it into something of value (after *Hermann Hesse*).