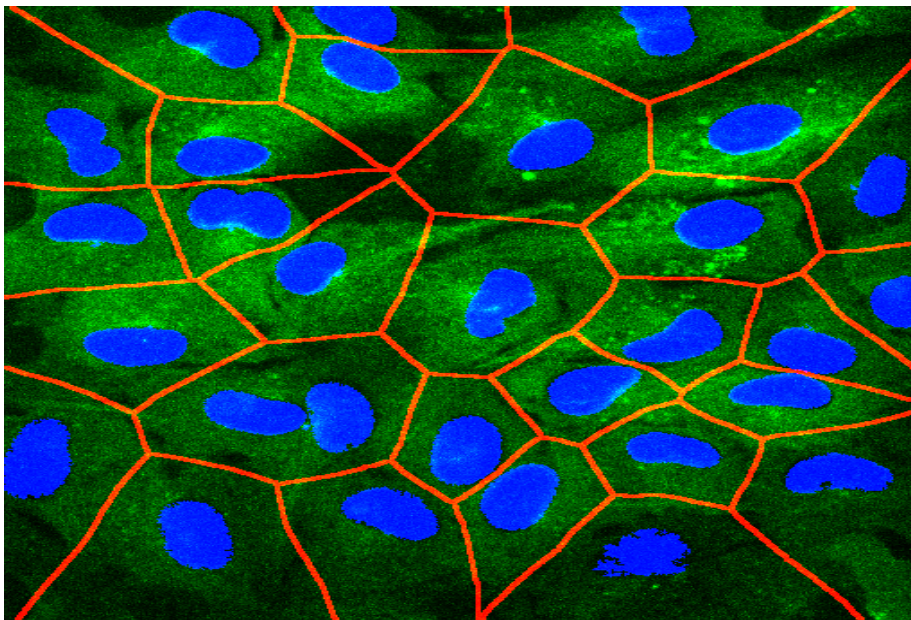


Machine learning for bio-image analysis

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Introduction to Machine Learning

”Machine learning algorithms build a mathematical model of sample data, known as ”training data”, in order to make predictions or decisions without being explicitly programmed to perform the task.”[1]

Machine learning is a sub-field of artificial intelligence. It is closely related to statistics, statistical learning, data-mining and optimization. A number of machine learning applications are today in use on a regular basis. Machine learning is for example used in

- speech recognition
- image recognition
- spam filtering
- medical diagnosis
- games: chess, checkers, go
- price prediction
- recommendation of products
- self-driving cars
- fraud-detection

In bio-image analysis classical machine learning (as opposed to deep-learning) is for example used for:

- pixel classification (segmentation)



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CHAPTER 2. INTRODUCTION TO MACHINE LEARNING

- cell counting
- object classification (types of cells)
- tracking
- Interactive 3D Segmentation (carving)
- Boundary-based segmentation with Multicut

Deep learning is a special form of machine learning that we will treat in the second part of this course. More recently deep-learning is applied to solve bio-image analysis problems. Besides applications already listed for classical machine learning, some examples are:

- image restoration
- prediction of distance maps
- predict high-resolution images from a low-resolution images in SRLM
- segmentation of bacteria cells

Bibliography

- [1] Wikipedia contributors. Machine learning — Wikipedia, the free encyclopedia, 2019. [Online; accessed 17-January-2019].