Image analysis for gene expression based phenotype characterization in yeast cells

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Stellingen (Propositions)

behorend bij het proefschrift (accompanying the thesis)

Image Analysis for Gene Expression based Phenotype Characterization in Yeast Cells

1. Success of image analysis in life science experiments requires a comprehensive pipeline; i.e. segmentation, measurement, data analysis and visualization. Without such processing pipeline the value of the results is severely reduced.

   This thesis, Chapter 2

2. The best approach to segment ovoid objects is by parameterization and refinement using Hough Transform and Dynamic programming respectively. Hough Transform to detect the objects and dynamic programming to cope with noise.

   This thesis, Chapter 3

3. The fusion of moment invariants with wavelet-based features increases the success rate of classification. This is successfully applied with yeast cells but can be generalized.

   This thesis, Chapter 4

4. Subtle patterns in the spatial distribution of gene expression as visualized by a microscope, can only be revealed by machine learning with a sufficient feature set.

   This thesis, Chapter 4

5. Complementarity in measurement strengthens each of the complements by providing validation. Such is, for example, the case with flow cytometry and microscopy in yeast biology.

6. Humans see the unified whole. Through image analysis a computer can see separate pieces. The big step is for a computer to have an integrative vision using principles of Gestalt.

7. Many genetic and hereditary diseases are still incurable because we lack through understanding of protein behaviour. To unfold the mysteries of protein behaviour and contribute to a healthy society, governments, funders, publishers, universities and academics must put more effort on interdisciplinary research.

8. A successful bioinformatician is one who can fill the gap between computer scientists and biologists by convincing both parties while maintaining successful communication in both disciplines.

9. In research, proper preparation and time management is quintessential prior to data analysis. Without it, data do not reveal their secrets.

10. *"The assumption that seeing is believing makes us susceptible to visual deceptions" [Kathleen Hall Jamieson].* This is very true for microscope imaging in which patterns are often beyond the obvious.

11. Hearing difficulties complicate professional and social integration. In either case, the key for healthy interaction is to be proactive and initiate communication.

12. A civilized society is one that offers justice to all its citizens, not one that offers them equality.

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