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Computer-Assisted Image Analysis, 5hp



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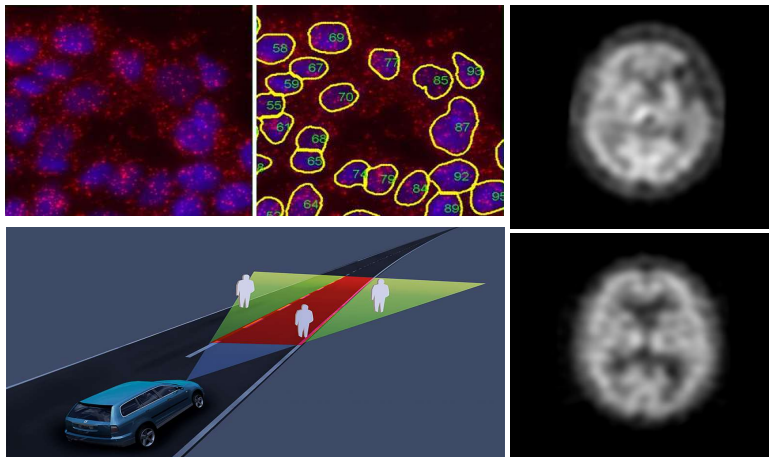
Methods – tools – applications

**1TD396
period 2**



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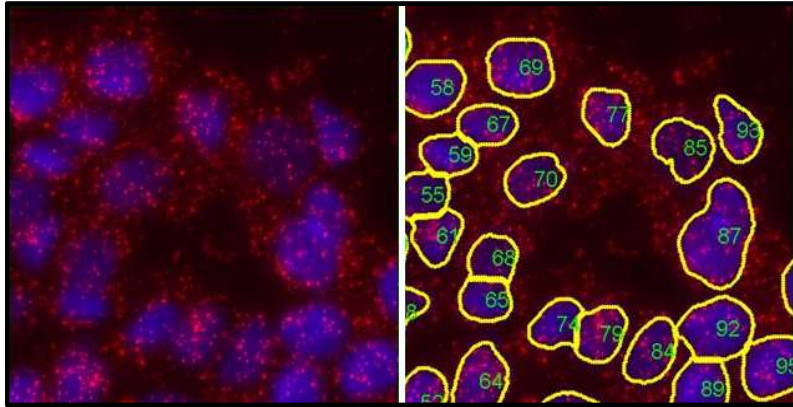
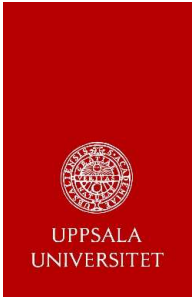
Why this course?



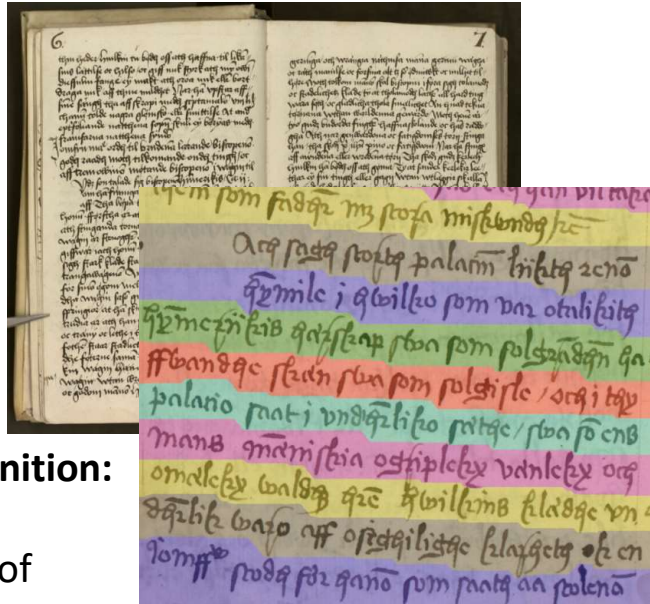
An **opportunity** to get deeper insights. Hopefully, it will create an **interest** in continued studies and work in our domain!

Have you worked with photos, using a photo digital software?
You might have improved the focus of a blurry photo?
If that is the case, you have worked with digital image analysis.

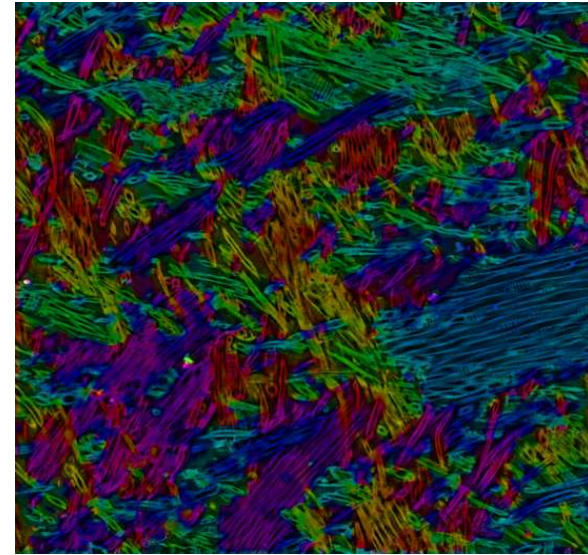
In computerised image analysis, we deal with the problem of transforming images to information and to knowledge.



Drug development:
How does a drug affect the protein expression in individual cells?



Text and character recognition:
Who wrote this book?
Does it contain anything of interest to me?



Material characterisation:
How does the length, orientation, and mixing of fibres affect the quality of the paper?



Face recognition:
Is this the same person and who is it?



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Course Contents

Concepts and techniques to understand and solve image-related problems

Lectures

1. Introduction
2. Pointwise operators
3. Filtering
4. Filtering II
5. Segmentation
6. Colour and compression
7. Object description and feature extraction
8. Classification
9. Deep learning for image analysis
10. Industry and research perspectives on image analysis

Computer exercises

1. Basic image handling
2. Local operators
3. Segmentation
4. Classification
5. Problem solving and competition



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Learning Outcomes

On completion of the course, you should be able to:

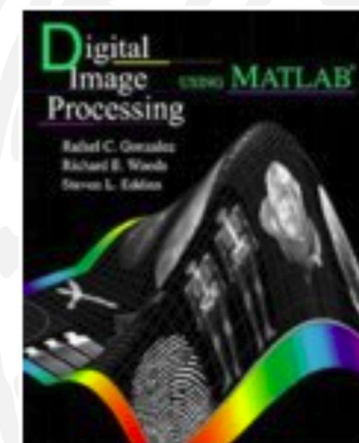
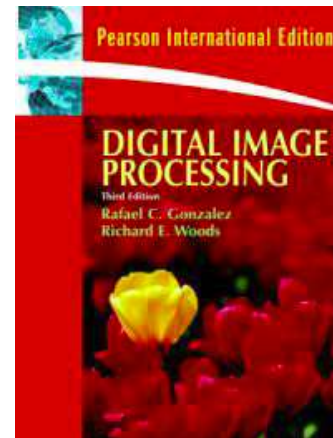
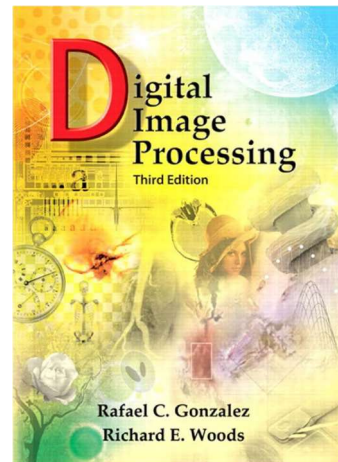
- explain fundamental notions on computerised image analysis, such as, digitising, image enhancement, segmentation and classification of features;
- use methods for image compression, distance computation, frequency analysis, etc.
- use software (MATLAB) for implementing algorithms for solving image analysis problems;
- analyse and outline the steps necessary to solve a realistic image analysis problem;
- give examples of applications in research and industry where image analysis is used.



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Course Literature

- Lecture notes
- Computer exercise instructions
- Textbook: Gonzalez & Woods,
Digital Image Processing, 3rd edition
- (Digital Image Processing using MATLAB)





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Lectures with several expert guest lecturers and course assistants for the computer exercises

Examination:

- **2 hp, group work (pass or fail)**
 - 5 computer exercises
 - Work in groups of 3 people
- **3 hp, individual grade (3 - 4 - 5)**
 - Written examination in Inspira