Why Visual Computing and Communication?

• The human being is ocular-centric

• Visual data on the Internet (Cisco forecast 2021)
  • In 2021, it will take an individual more than 5 million years to watch the amount of video that will cross global IP networks each month.
  • By 2021, global IP video traffic will be 82% of all consumer Internet traffic.

• Strong research area worldwide
Developed Skills

1. Understand the potential of visual data
   • Lean how visual data is processed
   • Lean how to make decisions based on visual data

2. Design and build systems for visual computing
   • Streaming systems for immersive data
   • Decision systems for autonomous systems

3. Operate in a multicultural environment
   • Human communication beyond technology

4. Learn from successful businesses and develop own ideas
   • Innovation and entrepreneurship for visual technology
Job Opportunities
Programme Structure

• First Year: Choose one of the two entry universities:

• Second Year: Choose one of the following specializations . . .
Specializations

- **Mobile Visual Computing**
  (KTH, Stockholm, Sweden)

- **Computer Vision and Multimedia Analysis**
  (UniTN, Trento, Italy)

- **Web-based Applications**
  (Aalto University, Helsinki, Finland)

- **Communication Services and Applications**
  (BME, Budapest, Hungary)

- **Advanced Image Understanding (planned)**
  (Sorbonne University, Paris, France)
Courses at KTH (1\textsuperscript{st} Year)

- **Obligatory Technical Courses**
  - DH2320 Introduction to Visualization and Computer Graphics
  - EQ1220 Signal Theory (when exiting at UniTN, KTH)
  - EP2120 Internetworking (when exiting at Aalto or BME)
  - DH2642 Interaction Programming and the Dynamic Web (when exiting at Aalto)*

- **Additional Obligatory Course (7.5 ECTS)**
  - AK2036 Theory and Methodology of Science with Applications (or equivalent, like II2202)
Courses at KTH (1\textsuperscript{st} Year)

• Obligatory I&E Courses (19 ECTS)
  • ME2072 Entrepreneurship for Engineers
  • ME2073 Business Development Lab for Entrepreneurship
  • ME2078 Summer Course – Entrepreneurship for Engineers

• Choose One Additional Obligatory I&E Course (7.5 ECTS)
  • ME2062 Technology-based Entrepreneurship
  • ME2094 Internet Marketing
  • ME2095 e-Business Strategies
Courses at KTH (1st Year)

• Elective Courses
  • DD2257 Visualization
  • DD2476 Search Engines and Information Retrieval Systems
  • EP2200 Queuing Theory and Teletraffic Systems (choose EP2120)
  • EQ2845 Information Theory and Source Coding (choose EQ1220)
  • DD2423 Image Analysis and Computer Vision (choose EQ1220)
  • EQ2461 Seminars in Information and Network Engineering
  • DH2323 Computer Graphics and Interaction
  • DD2421 Machine Learning
  • EQ2341 Pattern Recognition and Machine Learning
  • EQ2425 Analysis and Search of Visual Data
  • DH2642 Interaction Programming and the Dynamic Web
Mobile Visual Computing

@ KTH, Stockholm

Why Mobile Visual Computing?

• Where visual computing meets telecommunication
• Communication-constrained visual data processing
• High societal impact
• Many business opportunities:
  • Media analysis
  • Mobile visual media
  • Mobile autonomous systems
  • ...
Free-Viewpoint Experience

• Free-viewpoint experience of sport events

• Augmented reality
Mobile Visual Search

- Mobile augmented reality
- Advanced mobile services
- Beyond image-based search
- Learned image descriptors
Mobile 3D Visual Search

- Search aided by 3d geometry

[Stockholm Buildings Database]

http://people.kth.se/~haopeng/M3DVS/index.html
Courses at KTH (2nd Year)

• Obligatory Master Thesis (30 ECTS)
  ☑ XXxxxx Degree Project

• Obligatory I&E Course (6 ECTS)
  ☑ ME2096 ICT Innovation Study Project

• Additional Obligatory Course (7.5 ECTS)
  ☑ II2202 Research Methodology and Scientific Writing
  (or equivalent, like AK2036)
Courses at KTH (2\textsuperscript{nd} Year)

• Obligatory Technical Course (7.5 ECTS)
  □ EQ2330 Image and Video Processing

• Elective Courses
  □ DD2429 Computational Photography
  □ EQ2300 Digital Signal Processing
  □ EQ2321 Speech and Audio Processing
  □ EQ2401 Adaptive Signal Processing
  □ EQ2310 Digital Communications
  □ EQ2411 Advanced Digital Communications
  □ EQ2415 Machine Learning and Data Science
  □ EQ2425 Analysis and Search of Visual Data
  □ EQ2461 Seminars in Information and Network Engineering
Some Internship Opportunities
Some Master Thesis Projects

• Efficient features for movie recommendation systems (VionLabs)
• A document recommender based on word embedding (Meltwater)
• Machine learning for text-independent speaker verification (Ericsson)
• Integral video coding (Ericsson)
• Implementation and evaluation of an augmented reality teleoperation system (Ericsson)
• Playful advertising: In-game advertising for virtual reality games (Goo Technologies)
• Hand segmentation from RGB images in uncontrolled indoor scenarios using randomized decision forests (ManoMotion)
• Efficient selection of training data for an image classification task (Scania)
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