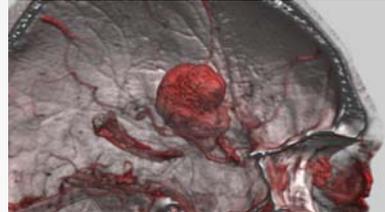# Visualisierung Medizinischer Daten 2

VU 2

WS 2009

Katja Bühler

vrvis

Teacher

Katja Bühler

Project Manager, Medical Visualization, VRVis

Telephone: 20501 30702

Email: buehler@vrvis.at

Web: www.vrvis.at

Office hour:

After the lecture and individual arrangement

vrvis

The lecture

- Will be in English

- **Will be a mixture of seminar and lecture**, i.e. in form of

    - presentation given by myself

    - 2 excursions

    - presentations on medical visualization / image processing topics prepared and given by you

- **The practical part of the lecture is covered by**

    - **Presentation (~35 minutes)**

    - **Summary (min 5 pages) prepared by you**

- **The "exam" is your presentation, the summary and your presence at the lectures / excursions**

Katja Bühler

v r vis

Your Job

Prepare a talk on a given topic that gives your colleagues the chance to get an idea on medical questions, and related technical problems and solutions

How?

- Read the assigned paper(s) and/or given "web entry points"

- Try to understand the content

- **Find background information and additional literature/material**

- Workout technical details, that are unclear for you and/or maybe for your audience

- Prepare a talk *on the given topic, i.e. medical and technical background, computational approach(es) to the problem, results and discussion*

- Prepare a summary, e.g. a little state of the art report or a "how to"

Katja Bühler

v r vis

ToDo´s

- **December:**
  - **Individual meeting to discuss first draft, possible problems, literature,….**

- **January:**
  Presentation 35 minutes + 5 minutes of discussion
  - **Bring printouts of your summary or of slides for your colleagues**

- If you have questions come to me….
  … maybe I can answer them directly :o)

v r vis

Time schedule

- **Mo. 19.10.08, 11:00 -12:30
  Visualization for Neurosurgery and Neuroscience**

- **Begin of November: Excursion Neurosurgery Department, Medical University Vienna**

- **Excursion AGFA Healthcare (to be confirmed)
  (or Lecture on Cardiology Topics)**

- **December: Individual Meetings**

- **18.1.08 full day – your presentations**

- **Deadline for all summaries: 18.1. 2008**

v r vis

Reading Assignments

- Most of this years topics are selected papers from the following conferences:

  - MICCAI 2009 http://www.miccai2009.org/
    and related Workshops
    http://ubimon.doc.ic.ac.uk/MICCAI09/m731.html

  - IEEE Visualization, VAST, InfoVis 2009
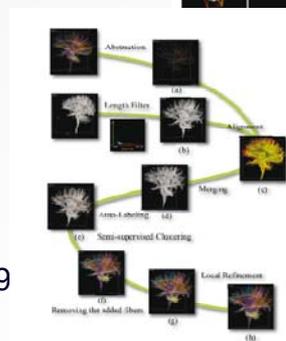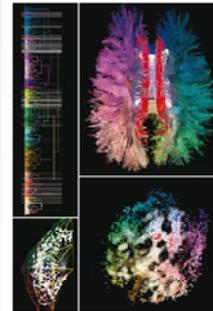   - http://vis.computer.org/VisWeek2009/vis/

Katja Bühler

v r vis

Diffusion Tensor Imaging

Papers from Vis2009 and
  MICCAI 2009

- Fiber Tracking

- Registration of DTI

- Visualization/exploration
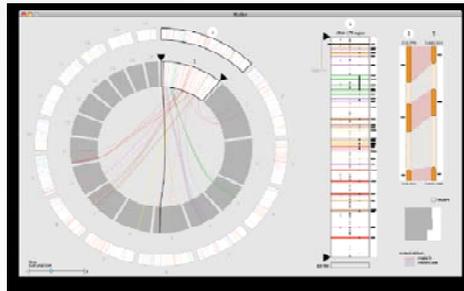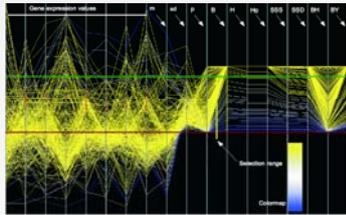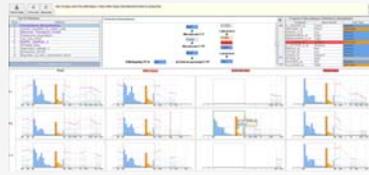
- Reliability of DTI

- Vis2009 Contest
  - http://viscontest.sdsc.edu/2009/

Katja Bühler

v r vis

InfoVis For Biotech

- Exploration of Genomic Data
    - Gene Expressions
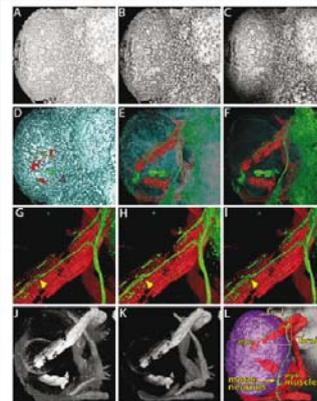   - Genome Sequences
    - Papers from InfoVis + VAST 2009

Katja Bühler

Visualization and Processing of Microscopy Images

- Visualization and Exploration of Confocal Microscopy Data (Vis 2009)

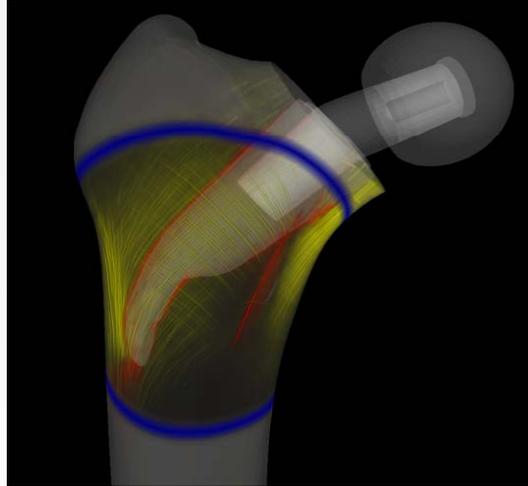- Analysis of High Resolution Microscopy Data (MICCAI 2009 Workshop)

Katja Bühler

Intervention Planning

- Planning of Total Hip Resection (Vis 2009 + related papers)
  - Analysis
  - Visualization
  - Interaction
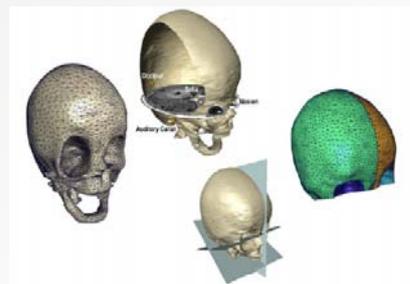 - Validation

- Other Topics on Request

Katja Bühler

Model Based Reconstruction of Cranial Structures

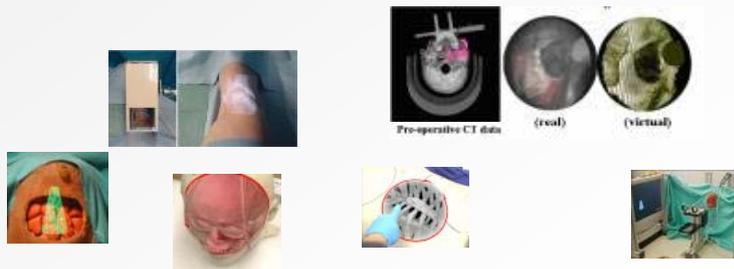- Medical Background

- Shape Models

- Clinical Application

- http://www.zib.de/visual/projects/craniosynos/craniosynoslong.en.html

Katja Bühler

Image Guided Surgery

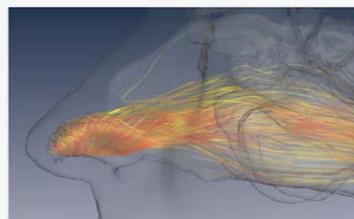- Papers from the Ami-Arcs Workshop 2009 (MICCAI) http://campwww.informatik.tu-muenchen.de/AMIARCS09/doku.php

---

Flow Visualization in Medicine

- Visualization and Exploration of Nasal Airflow (Vis 2009)

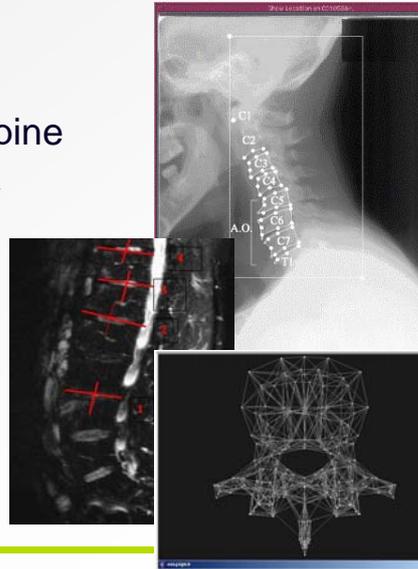- Blood Flow Simulation and Visualization (MICCAI 2009 and related papers)

The Spine: Segmentation + Labeling,

- Medical Background

- Methods for vertebra and spine
  segmentation in X-Ray, MR
  and CT images

- Analysis

- Spine Labeling

- Biomechanics + Simulation

(MICCAI 200*, IEEE TMI)

Katja Bühler

Probabilistic Models For Medical Image Analysis

- Papers from the PMMIA Workshop 2009
  (MICCAI)
  http://people.csail.mit.edu/pohl/pmmia09.html
  - impact of prior information in medical analysis
  - registration and segmentation of medical scans
  - statistical frameworks for functional analysis
  - hypothesis testing,statistical shape modeling
  - validating accuracy of probabilistic models
  - controlling model complexity and efficient algorithms
    for determining optimal solutions by use of these
    models.

Katja Bühler

Validation of Segmentation and Visualization Algorithms

- How can we ensure the quality of segmentation results?

- How do we know that our visualization method shows all relevant data?

- What techniques exist to evaluate segmentation/visualization algorithms?

Katja Bühler

v r vis

MICCAI 2009 http://www.miccai2009.org/

- Conference Overview
  - Prepare a summary of the conference
    - Which topics?
    - New Trends?
    - Best Papers

20-24 September
MICCAI 2009
London UK

International Conference on Medical Image Computing and Computer Assisted Intervention

Katja Bühler

v r vis

Your chance….

- ….to learn a lot about actual research in the field of medical visualization, vision, and simulation.

- ….to learn how research works, how papers are written and how to criticize them.

- ….to get a little bit deeper into a topic that (hopefully) interests you.

- ....to learn how to present advanced knowledge in an understandable way.

- ….to have the possibility to go on with this topic in form of practica, baccalaureate, master or diploma theses.

Katja Bühler

v r vis