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Interactive Exploration of Digitized Manuscripts:

Introducing the *iXMan_Lab*

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Computing in the Humanities

- With the recent advances in the application of computational techniques in humanities a.k.a Digital Humanities
  - Explosion of tools enabling thorough manuscript understanding and/or digital paleography.
- But only a few of the tools have found wide-spread and consistent acceptance.
  - Particularly, in the context of Digital Paleography

Image from http://www.tdbowman.com/2012/09/scientometrics-scholarly-communication-and-big-data-oh-my/

Computing in the Humanities

- Reasons for this can be briefly outlined as follows
  - Development solely from Informatics POV
  - (Usually) not involving (the target) end-users in any shape or form
  - Methods (and their interfaces) not particularly tailored to end-users.
  - (Particularly) No user evaluation
- Tools are (probably) scientifically well-set but rank low in terms of usability and usefulness

Image from http://www.tdbowman.com/2012/09/scientometrics-scholarly-communication-and-big-data-oh-my/

Approaching Computing in Humanities

- Development should not be approached through the viewpoint of Informatics alone
- Taking users' perspectives into consideration
  - Understanding their workflow
  - Analyzing their requirements and framing relevant scientific challenges
- Developing user-centered systems
  - Experimentally evaluating such systems through real-world applications

Image from https://news.fordham.edu/arts-and-culture/defining-boundaries-digital-humanities/

Approaching Computing in Humanities

- Making users take control over the method a.k.a user-in-the-loop
  - Aim at providing semi-autonomous/user-centered systems
  - Very few people need completely autonomous systems
    - Some even absolutely hate it
    - Especially, in Paleography/Manuscript Studies
- Making methods/techniques more accessible and interpretable
- Particularly focus on UI/UX part

Image from https://news.fordham.edu/arts-and-culture/defining-boundaries-digital-humanities/

Need for Interactive Exploration

- You cannot (always) provide an exact solution for all the problems
- Real-world scenarios are not very perfect
  - Lack of quality data (in some cases, lack of data itself)
  - Absence of proper workflow
- Users usually like to control/over-ride methods
  - They don't tend to trust computers blindly
- Providing them with a toolbox
  - Which they can use to construct their own solutions

Need for Interactive Exploration

- Tailor the interactive exploration to the needs of scholars
- Adopt proper visualization techniques
  - Interpret input/output parameter regimes
  - Interpret results that are often numbers (without any context),
  - Help understand how a method works.
  - Create workflows and
- Overall, assist in performing productive exploration

“how will scholars in humanities work with digitized manuscripts in the future?”

iXMan_Lab

- **i**nteractive e**X**ploration of **Man**uscripts **Lab**oratory
- Motto is to develop concepts, paradigms and prototypes that help usable and useful software tools for manuscript scholars
- In terms of hardware capabilities, the laboratory currently has:
  - Custom built 65-inch multi-touch table (MTT)
  - Multicore gaming engine to support image processing methods

iXMan_Lab

- To innovate and research on
  - Interaction Paradigms for Manuscript Studies
  - Accessible Image Processing
  - designing a manageable processing chain for analyzing digitized manuscript based on computational vision methods
- All the above focusing on Multi-Touch Tables

Why Multi-Touch Tables (MTT)?

- Traditional WIMP (Windows-Icons-Menus-Pointers)
  - Becoming increasingly outdated
  - They often don't reflect the domain
  - Are not intuitive
- Touch interfaces through MTT
  - Allow designing interaction paradigms reflecting the domain
    - through gestures
  - Large interaction area is good for collaboration

Advanced Manuscript Analysis Portal (AMAP)

- AMAP aims to implement such an intuitively usable system
  - with a domain-inspired interaction paradigm.
- Allowing users to freely explore digital manuscripts
  - with familiarity
  - with intuitiveness
  - Similar to working with physical artefacts.

AMAP: Architecture

- Portable browser-based architecture (HTML/JS) with multi-touch gesture support
  - Vue.js with Quasar as frontend
- OpenCV based python back-end server for resource-heavy image processing
- Integration of other backend systems that provide image processing and analysis techniques as web-based services
  - For instance, DIVAServices have been integrated into AMAP

AMAP: Prototype

- Allows users to deal with advanced image processing techniques and manuscript related methods
- Creates customized processing chains or performs one-time analyses.
- Even advanced methods can be applied in an easy and intuitive manner by someone without any technical background.
- Encourages the exploration of various techniques and workflows without any steep learning curve.

AMAP: Prototype

- Implements an innovative hybrid visual programming language
  - Integrates both a flow-based and block-based approaches.
- The UI paradigm works on the principle of visualizing the digitized documents and methods as virtual objects
  - that can be manipulated spatially in relation to each other to perform various chained operations and/or create workflows.
- The UI is particularly designed to reflect real-world metaphors as much as possible in terms of interaction

AMAP: Prototype

- Within the SFB 950, the lab's affiliated scientific service project Z03 is currently working on
  - Writer identification and keyword spotting
- Integrated both of the functionalities into AMAP.
- Such integrations demonstrate the flexibility of our approach
  - as well as the ability to assimilate wide-ranging manuscript-related methods into our platform.

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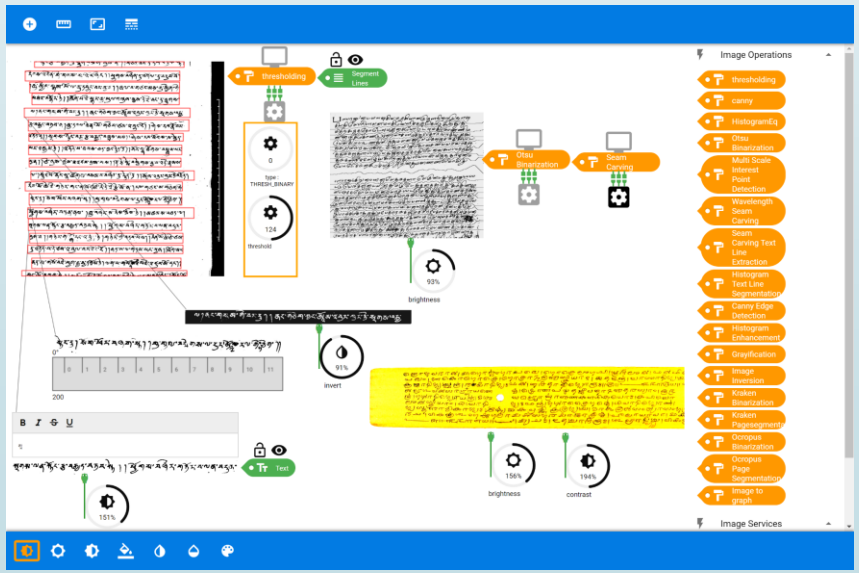
Demonstration



Conclusion

- The current state of computing within Humanities
  - How it should be ideally approached
- The need for interactive exploration of digitized manuscripts
  - To enable scholars to access various available methods easily
- The current status of AMAP @ iXMan_Lab
- In summary, iXMan_Lab is intended to be a fertile environment
  - To develop and encourage contributions to manuscript studies and digital paleography

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Danke Sehr
&
Fragen?