

„Wir müssen reden! Geh’n wir zu Dir oder zu mir? “

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(„Seniorprofessor“ 😊)

Universität Hamburg

FB Informatik, AB Bildverarbeitung

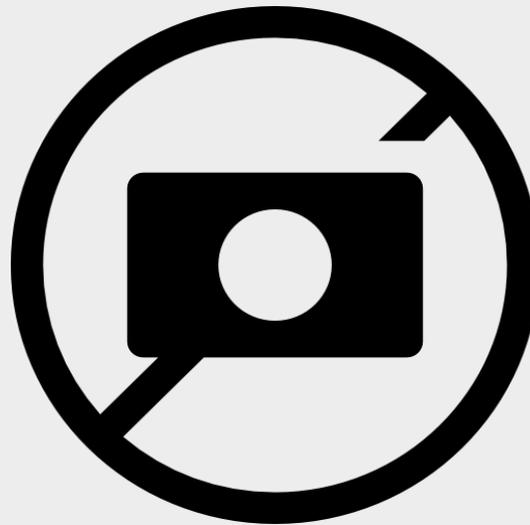
&

SFB 950

„Challenge Workshop“ – eine wirklich gute Idee!

- „... *Schnittmengen* zwischen Informatik und Schrift- und SprachforscherInnen ...“
- „... Welche Computeranwendungen und Algorithmen *helfen* bei der Analyse antiker Schriften? ...“
- „... Welche *neuen* Methoden gibt es für die digitale Paläographie? ...“
- „... *Möglichkeiten* und *Grenzen* verschiedener Methoden ...“
- „*Zusammenarbeit* zwischen Informatik und Alterswissenschaft“

Tenshun: Partly Unpublished Material – Respect I.P.R!

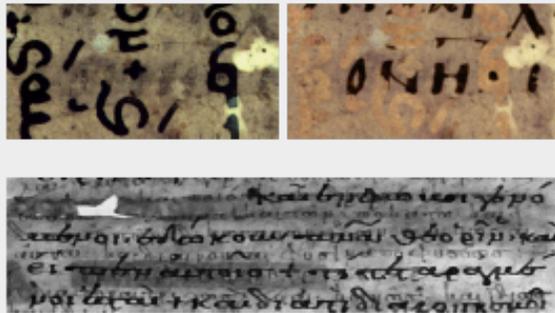


Context SFB 950

- SFB 950 „Manuscript Cultures in Asia, Africa, and Europe“
- Collaborative Research Center (CRC) @ CSMC
- Funding thru German Research Foundation (DFG)

- 1st Funding Phase 2011 – 2015
- 2nd Funding Phase 2015 – 2019 → 3rd FP ≠ ExC “U.W.A.”
- Structure
 - 22 Sub-Projects (TP) from Faculty of Humanities
 - 3 Scientific Service Projects Z01/Z02/Z03 (*plus* INF)

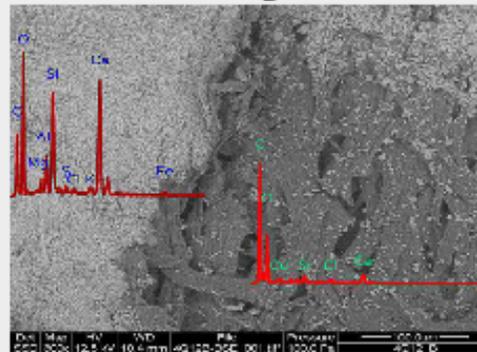
visualize



Z01

Lost Writing
Recovery

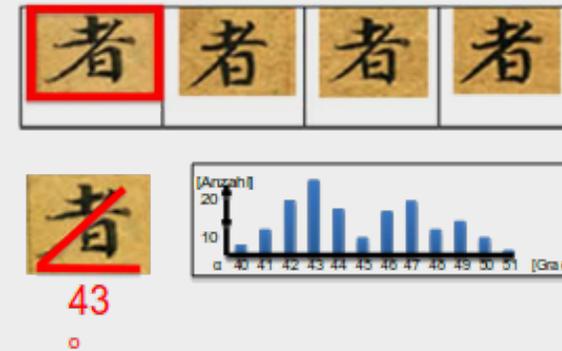
analyze



Z02

Materials Science

characterize



Z03

Image Processing

SFB 950 Scientific Service Projects (O. Hahn, 2015)

*[Kick-off Mtg of] Scientific Service Project Z03
(Xtended 2018 Version)*

„Image Processing Methods for Determining Visual Manuscript and Character Features“

H. Siegfried Stiehl, Volker Märgner,
Thomas Konidaris, Hussein A. Mohammed
plus Vinodh Rajan Sampath and Bachelor/Master Students

Phase I (Recap)

- Goals 2011-2015
 - „to develop ... *innovative methods* for analyzing and comparing manuscripts ...
 - to *apply* these methods to *research questions* ...
 - to *integrate* the methods in a *workplace* ... which can be operated by computer laypersons ...“*
 - Service to Sub-Projects via *ARMA Prototype*



Phase I

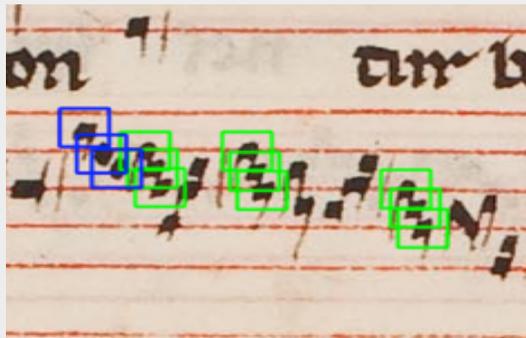
Sub-Project	Z01	Z02	Z03
A01			
A02			
A03			
A04			
A05			
B01			
B03			
B04			
B05			
C01			
C02			
C03			
C04			
C05			
C06			
C07			



Cooperation (Done)
Preparatory Investigation

Phase I (cont.)

- Research Questions (1)
 - B03 Manuscript Culture and Chant Communities...
 - Detection of Ligatures*
 - Classification w.r.t. Rhomb/Square Notation



Phase I (cont.)

- Research Questions (2)
 - B05 Form and Functions of Layout in Arabic MSS...
 - Text-Background Segregation*
 - Detection of Oriented Textblocks



Phase I (cont.)

- Research Questions (2)
 - B05 ...



Phase I (cont.)

- Status quo
 - Dissertation (submitted) R. Herzog*
 - Master Thesis (WIP) Ch. Kassens*
 - Footing: Gabor Transform⁺
 - Validation via Ground Truth Data (RH)

Phase I (cont.)

- Status quo*



DMS (Original)



Ground Truth (1/30)



Result

Phase I (Recap)

- Goals 2011-2015
 - „to develop ... *innovative methods* for analyzing and comparing manuscripts ...
 - to *apply* these methods to *research questions* ...
 - to *integrate* the methods in a *workplace* (ARMA) which can be operated by *computer laypersons*“*
 - *Service* to Sub-Projects via *ARMA Prototype*

Phase I (cont.)

- Goals⁺ 2011-2015
 - ARMA: „Workstation for Computer-Aided Analysis of Manuscripts“ (HTML5, Javascript, Python, ...)*
 - IP/IA Toolbox
 - Interactive Palaeography (e.g. Length, Angle, ...)
 - Character (Word) Spotting
 - Layout Segmentation



Phase Transition I-II

Sub-Project	Z01	Z02	Z03
A01			
A02			
A03			
A04			
A05			
B01			
B03			
B04			
B05			
C01			
C02			
C03			
C04			
C05			
C06			
C07			

Cooperation (Done)
Preparatory Investigation



Sub-Project	Z01	Z02	Z03
A01			
A03			
A04			
A05			
A06			
A07			
B03			
B05			(•)
B07			
B08			•
C01			
C04			
C05			
C06			
C07			
C08			•
C09			
C10			
C11			

Cooperation (Planned) / Pilot Project (•)
Preparatory Investigations

Phase II

- Goals 2015-2019*
 - Focus on *Service to Research Praxis* in Sub-Projects
 - *Incremental Upgrade* of ARMA à la ...
 - „*Breadth* ere *Depth*, *Interaction* ere *Automation*“
 - *Foci*: Interactive Paleography, Word Spotting, and Hand Identification
 - „Advanced Manuscript Analysis Portal“ *Prototype*

Phase II (cont.)

- Paradigm 2015-2019 à la DSRP*
 - *7 Guidelines* à la Hevner et al. (2004)
 - Purposeful Artifact, Problem Relevance of R(&D), Demonstration of Utility, Quality, and Efficacy
 - Clear Contribution, Rigor of (Iterative) Research
 - Adequate Communication ... with PIs/Scholars (!)

(*see also*: Design Thinking Paradigm or STEPS)

Phase II

- Goals 2015-2019
 - Focus on *Service to Research Praxis* in Sub-Projects
 - *Incremental Upgrade* of ARMA à la ...
 - „*Breadth* ere *Depth*, *Interaction* ere *Automation*“
 - *Foci*: Interactive Palaeography, Word/Grapheme Spotting, and Writing Style Analysis
 - „Advanced Manuscript Analysis Portal“ *Prototype**

Phase II

- Goals⁺ 2015-2019
 - Further Development to Intuitive User Interface
 - Integration with SFB Repository (LT Archiving)
 - Application of Well-established Image Processing and Analysis (IP/IA) Algorithms
 - Development of Innovative IP/IA Algorithms
 - AMAP as *Web-based Platform/Tool* for Scholars

Phase II⁺

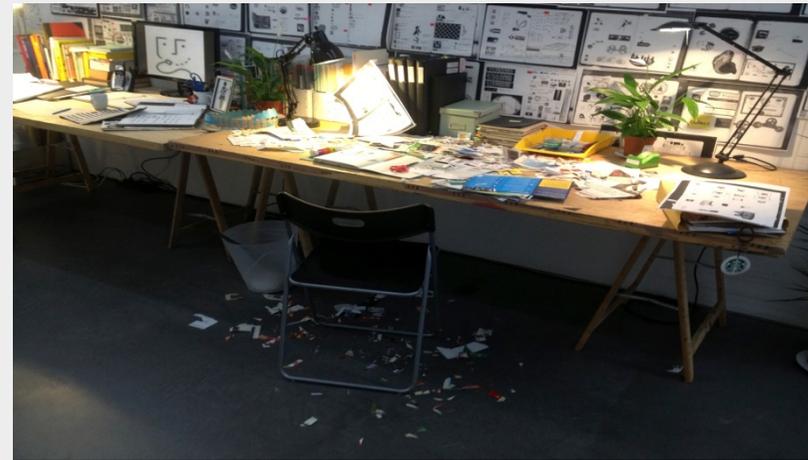
- Vision 202x
 - „How will we work with DMSS in the future?“
 - „Interaction Beyond the Desktop (WIMP)“ Metaphor*
 - „Keep-the-User-in-the-Loop“ Metaphor
 - Disciplinary and Cognitive Adequacy of IT Systems
 - Trends: Media Convergence, Mobility, and Ubiquity
 - AMAP⁺ Pilot (Reference System for MSS Research)

Phase II⁺

- Vision 202x (2)
 - Evolutionary Approach to AMAP: Past, Present, ... ;-)



(Mao Tongqiang, „Archives“, 2011-2012, Sigg Collection*)



(Wang Quingsong, „Follow You“, 2013, Sigg Collection*)

Phase II⁺

- Vision 202x (3)

- ... and Future



Interaction/Exploration Scenario via Multi-Touch Table*

Phase II⁺

- Reality 2018

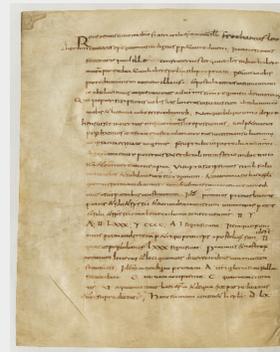
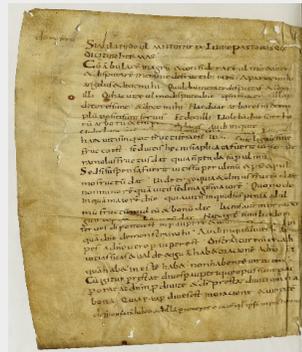
... and Route
to 202x



iXMan_Lab @ Department of Informatics (HSS&VRS*)

Phase II (Pilot Projects)

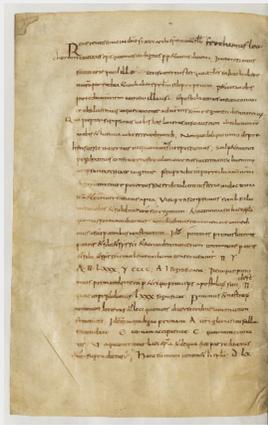
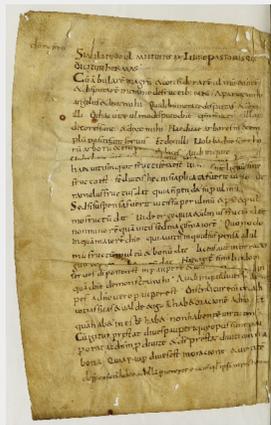
- Research Questions (1)
 - C08 East Frankish Manuscripts ...
 - Handwriting Style Analysis & Comparison
 - Scribe Identification / Scriptorium Attribution



Phase II (cont.)

- Status quo
 - Dissertation (WIP) H.A. Mohammed
 - Joint Work with P. Depreux & T. Hennings
 - Footing: LNBNN for Sparse & Unbalanced Data
 - Validation via Ground Truth Data
 - Open Source “Tool” HAT-2*

Data from SFB Sub-Projects*



C08
Medieval Latin MS
Source: (6)

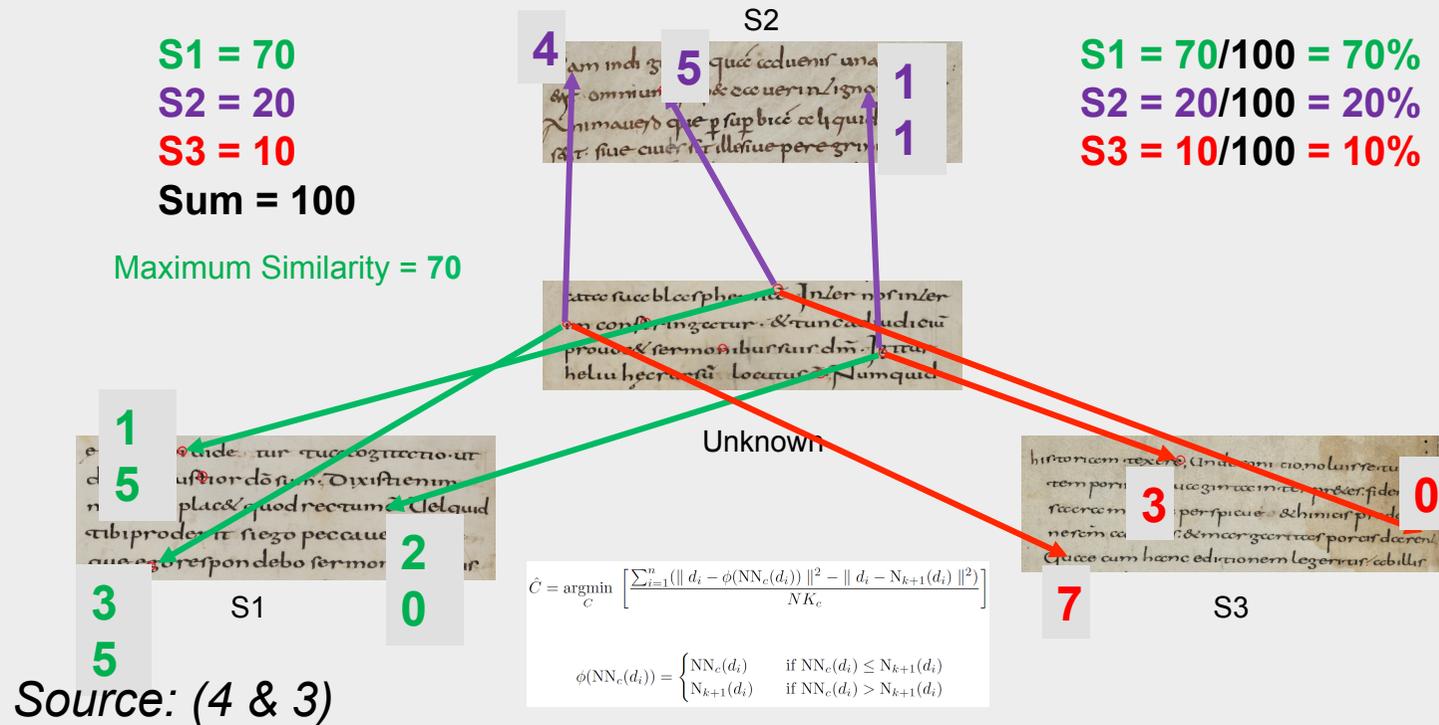
B05
Arabic MS
Source: (8)

Approach Illustration*

S1 = 70
S2 = 20
S3 = 10
Sum = 100

Maximum Similarity = 70

S1 = 70/100 = 70%
S2 = 20/100 = 20%
S3 = 10/100 = 10%



*Source: Computational Analysis of Writing Style in Digital Manuscripts – Hussein Adnan Mohammed; for details see also: ICDAR2017 & ICfHR2018

Phase II (Pilot Projects)

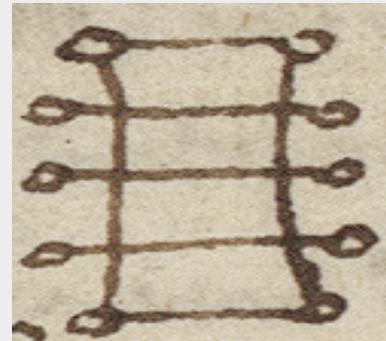
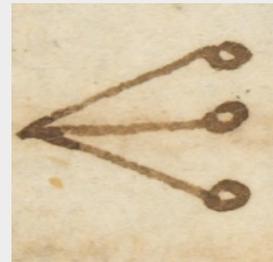
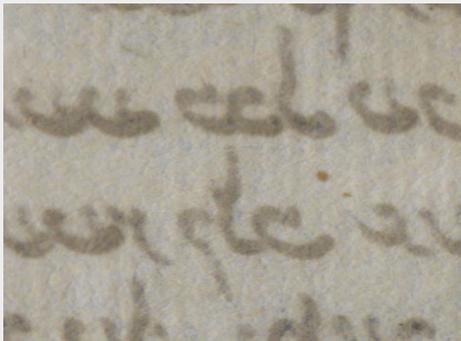
- Research Questions (2)
 - B08 Magia Figurata: The Visual Effect of ...
 - Detection/Classification of Visual Vocabulary
 - Taxonomy and Meaning



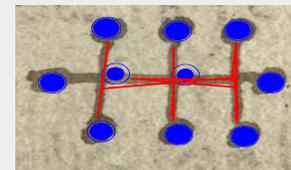
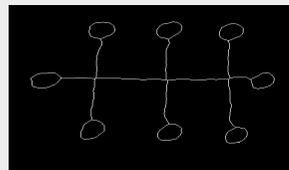
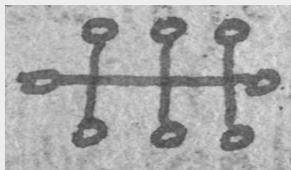
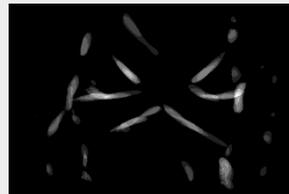
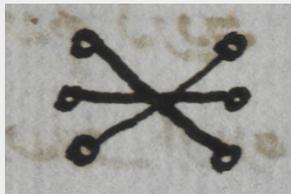
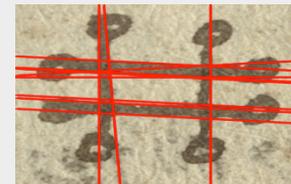
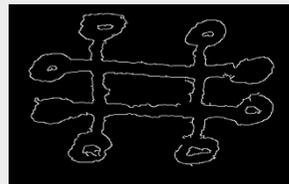
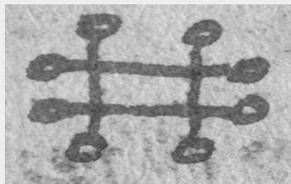
Phase II (cont.)

- Status quo
 - Master Thesis (WIP) Ch. Hahn (& P.S. Pandey)
 - Joint Work with M. Kohs
 - Footing: Hough Transform & Graph Theory
 - Validation via Ground Truth Data

- Problem Statement*



- Approach Illustration*



Phase II (Case Study; WIP)

- Research Questions (3)
 - B05 The Usage of Qur'an Manuscripts as Objects...
 - Hypothesis on Different Hands via Writing Style Analysis
 - LNBNN-based Decision Support for Falsification



„We Must Talk!“ – or: (My) Lessons Learned

- Two Cultures à la C.P. Snow (1959)
 - Hermeneutics vs. Algorithmics
 - Babylonian Confusion of Tongues
 - Sweet Expectation vs. Bitter Disappointment
 - Perseverance vs. “IT-based Innovation” (TINA)
 - SoA vs. Wheel of Fortune “Digital Humanities” (QH, eH)
 - Drowning in Day-to-Day Business

„We Must Talk!“ – or: (My) Lessons Learned (2)

- State-of-the-Art
 - Computational Vision (and Machine Learning)
 - Imbalance of Theory = Pubs vs. Practice = Toolbox
 - Curse and Misery of Experimentation (Ground Truth, MD)
 - Problem of Complexity Mastering (DOF; cf. FAT ML)
 - Lack of Real-Life Data from Scholars' Work Flow
 - Agenda Setting (e.g. SciCom, Funding Agencies, M.I.C.)

NB: Kurzer Einschub zu ...

- Bescheidenheit und Ehrlichkeit
 - hier: “KI” und Maschinelles Lernen
 - *Fragen à la B. Brecht*

(Quelle: H. Siegfried Stiehl, „Big Data .UND. Artificial Intelligence? Oder:
Wer B sagt, muss auch A sagen!“

Finissage „Freiheit 2.0“ • StadtPalais • Stuttgart • 24. Juni 2018)

„• *Fragen* von lesenden und denkenden Bürgerinnen und Bürgern an die Forschenden („check list“) zu KI à la ML/DNN:

- Begründung der Modell-/Methodenwahl
- Beweisbarkeit
- Passung der Modelle mit der Realität
- Annahmen zur Statistik der Daten
- Beherrschbarkeit der Komplexität (Freiheitsgrade und Parameterregime)
- Validität der Experimente
- Verfügbarkeit von „ground truth“
- Realitätskonstruktion durch Algorithmisierung
- Kontexte und Interessenskonflikte
- ...“

„We Must Talk!“ – or: (My) Lessons Learned (3)

- “Your Place First!”
 - Get off the IT couch and move to their cubicles!
 - Better to shut up!
 - Listen!
 - Ask – even childish questions!
 - Learn to understand their needs, demands, concerns!
 - Frame the dialogue in a requirement analysis (RE)!

„We Must Talk!“ – or: (My) Lessons Learned (4)

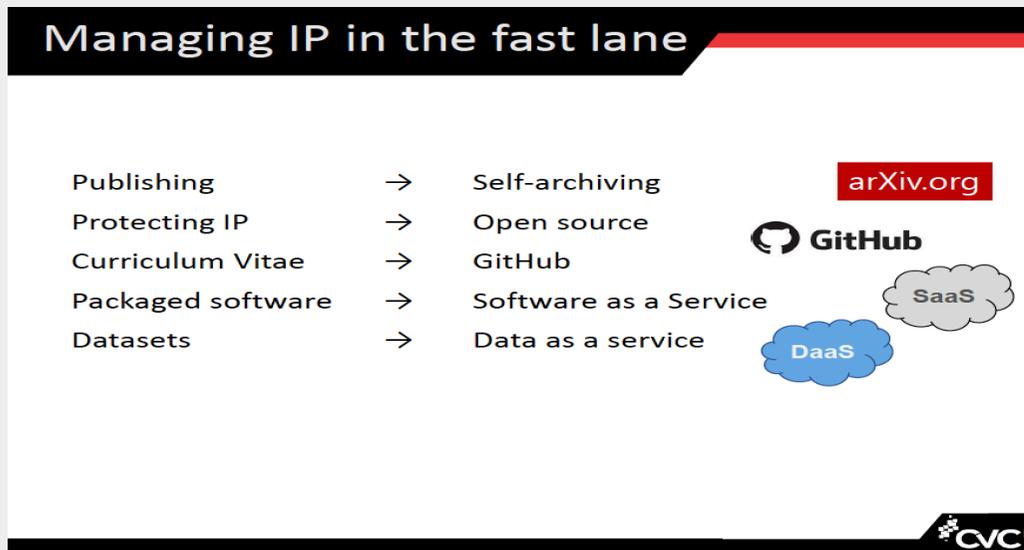
- “So, Now My Place Next!”
 - Explain what has been really understood in CV, ML, ...!
 - Demonstrate why what doesn't work yet!
 - Bring it all on the table! Ah, multi-touch table!
 - Play together, learn from each other, and be creative!
 - Build truly experimental set-ups for realistic use cases!
 - Configure, test, and deliver tools!

„We Must Talk!“ – or: (My) Lessons Learned (5)

- Radical Paradigm Shift: “It’s the User, St***!”
 - Fusion of CV + ML + HCI/HCC + Cognitive Psychology + X
 - Need of Methodology for Experimentation
 - Requirement Engineering, Design Thinking, and Agility
 - Added-Value Systems for Scholars (and Workflows)
 - Disciplinary, Cognitive, and Technological Adequacy
 - Novel Funding Schemes/Formats & Innovation Culture

„We Must Face Yet Another ...“

- Radical Paradigm Shift: Open Science*



Famous Last Words



- Keep-the-Scholar-in-the-Loop-and-in-Control (UI/UX)
- Visual Programming for Joint Experimentation
- Agility and Rapid Prototyping for Workflow Design/Support
- Platform Independence and Interoperability
- Web-based Platform with OpenX (X=: Data, Methods, Tools, Services)

Famous Last Pictures (1+2)





1. OpenCV Binarization
type THRESH_BINARY
threshold 153

18/9/2018 @ 11:1:16

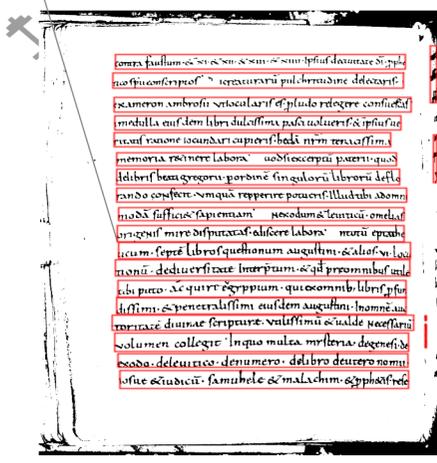
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1. OpenCV Binarization
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OpenCV Binarization

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THRESH_BINARY

117

threshold



- Binarization
- Other Image Enhancements
- Filters
 - Blur
 - Gaussian Blur
 - Median Blur
 - Bilateral Filter
- Feature Detection
 - Canny
 - Good Features to Track
 - ORB keypoints
 - Multi Scale Interest Point Detection
- Layout Analysis
- Propagate Actions
- Spotting
- Writer Identification
- Transcription



Add-on: Famous Last Words*

„Auf der rein praktischen Ebene kann der Geisteswissenschaftler von seinen naturwissenschaftlichen Freunden nicht viel lernen.

Mag sein, dass er gerne läse, was sie schreiben, aber er versteht sie nicht.

Umgekehrt wären die Naturwissenschaftler in der Lage zu verstehen, was der Geisteswissenschaftler schreibt; aber sie wollen es nicht lesen.“

(Erwin Panofsky, *1892 Hannover +1968 Princeton)

Some Sources of Food for Thought

<https://www.inf.uni-hamburg.de/en/inst/ab/bv/team.html>

<https://www.dropbox.com/sh/7a6h2md5ar5ze2o/AABteFlvGyE2JNouhWp2LJkNa?dl=0>

<https://www.manuscript-cultures.uni-hamburg.de>

- FIN -