ICDAR 2011
Doctoral Consortium

September 18, 2011
Beijing, China

Professor Daniel Lopresti
Computer Science and Engineering
Lehigh University
Bethlehem, PA , USA

Schedule

1:40 pm	Welcome
1:45 pm	“Advice for a Successful Ph.D. Experience”
2:10 pm	Brief oral introductions to student research plans
3:10 pm	Coffee break
3:25 pm	Student poster session with discussion and feedback
5:25 pm	Concluding remarks and Best Poster Presentation Award presentation

Welcome!

- Welcome to the first-ever Doctoral Consortium for the document image analysis community.
- Goal: to create an opportunity for Ph.D. students to test their research ideas, present their current progress and future plans, and receive constructive criticism and insights related to their future work and career perspectives.
- Special thanks are due to our volunteer mentors as well as to the ICDAR organizers, especially Professor Cheng-Lin Liu.
- We are also grateful to Raytheon BBN Technologies for their generous financial support which has allowed students and mentors to attend with no registration fee.

Organizing Committee

TC-11 Chair: Daniel Lopresti, USA

TC-10 Chair: Jean-Marc Ogier, France

Jean-Christophe Burie, France

Masakazu Iwamura, Japan

Gernot A. Fink, Germany

Dimosthenis Karatzas, Spain

Koichi Kise, Japan

Bart Lamiroy, France

Rafael Lins, Brazil

Josep Lladós, Spain

Mentors

Henry Baird, USA
Elisa Barney Smith, USA
Abdel Belaid, France
Jean-Christophe Burie, France
Gernot A. Fink, Germany
Masakazu Iwamura, Japan
Dimosthenis Karatzas, Spain
Koichi Kise, Japan
Bart Lamiroy, France
Rafael Lins, Brazil
Cheng-Lin Liu, China
Marcus Liwicki, Germany
Josep LLadós, France
Daniel Lopresti, USA
Jean-Marc Ogier, France
Faisal Shafait, Germany
Palaiahnakote Shivakumara, Singapore
Liu Wenyin, Hong Kong
Richard Zanibbi, USA

About IAPR, TC-10, and TC-11

- IAPR is the *International Association for Pattern Recognition*, the premier association for those involved in all aspects of pattern recognition research.
- As future leaders in the field, you should investigate IAPR and its activities to help support your career at www.iapr.org.
- IAPR Technical Committee TC-10 is devoted to work on graphics recognition (http://www.iapr-tc10.org/).
- IAPR Technical Committee TC-11 focuses on research relating to reading systems, including optical character recognition and handwriting recognition (http://www.iapr-tc11.org/).

Doctoral Consortium Students 1

Olivier Augereau
Université Bordeaux
Document Image Classification

Su Bolan
National University of Singapore
Document Image Enhancement

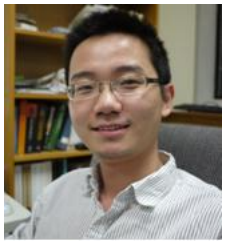
Klaus Broelemann
University of Muenster
Automatic Understanding of Sketch Maps Analysis

Doctoral Consortium Students 2

Syed Saqib Bukhari
Technical University of Kaiserslautern
Generic Layout Analysis of Diverse Collection of Documents

Bin Chen
Tokyo University of Agriculture and Technology
Effects of Artificial Sample Generation Models for On-line Handwritten Japanese Character Recognition

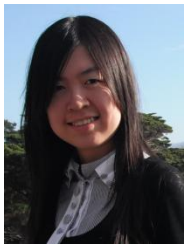
Jin Chen
Lehigh University
Exploiting Metadata in Off-line Handwritten Documents: Modeling and Applications



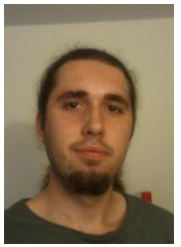
Doctoral Consortium Students 3

Lluís-Pere de las Heras
Universitat Autònoma de Barcelona
Syntactic Model for Semantic Document Analysis

Jing Fang
Peking University
Table Recognition and Evaluation in PDF Documents



David Hebert
Universite de Rouen
Investigations on the Use of Linear-Chain CRF Based Method to Segment Old Newspapers



Doctoral Consortium Students 4

Lei Hu
Rochester Institute of Technology
Recognition and Retrieval of Handwritten Mathematical Expressions

Le Kang
University of Maryland College Park
Touching Text Segmentation and Shape Analysis

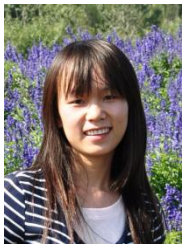
Muna Khayyat
Concordia University
Learning-Based Word Spotting for Arabic Handwritten Documents Using Hierarchical Classifier

Doctoral Consortium Students 5

Iuliu Konya
Fraunhofer IAIS, University of Bonn
Adaptive Methods for Robust Document Image Understanding

Jayant Kumar
University of Maryland College Park
Segmentation and Labeling of Mixed-type Noisy Handwritten Documents

Xiaoyan Lin
Peking University
Mathematical Formula Recognition and Retrieval in PDF Documents



Doctoral Consortium Students 6

Muhammad Muzzamil Luqman
Université François Rabelais de Tours
Efficient Indexing and Retrieval of Graphs Using Techniques for Embedding Graphs in Real-Valued Feature Spaces

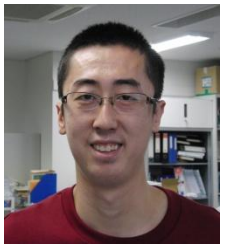
Nibal Nayef
Technical University of Kaiserslautern
Geometric-based Symbol Spotting, with Application to Symbol Retrieval in Document Image Databases

Weihan Sun
Osaka Prefecture University
Copyright Protection of Manga Using Content-based Image Retrieval Methods

Doctoral Consortium Students 7

Rabeux Vincent
Université Bordeaux
Document Image Quality Evaluation

Song Wang
Kyushu University
Part-Based Method of Character Recognition



Liang Xu
Institute of Automation, Chinese Academy of Sciences
Segmentation and Recognition of Touching Characters in Offline Unconstrained Chinese Handwriting

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“Advice for a Successful Ph.D. Experience”

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Oral Introductions

UNIVERSITÉ DE BORDEAUX

LaBRI

GESTFORM

Document Image Classification

Olivier Augereau

-

Bordeaux University - LaBRI

Advisors: Jean-Philippe Domenger, Nicholas Journet

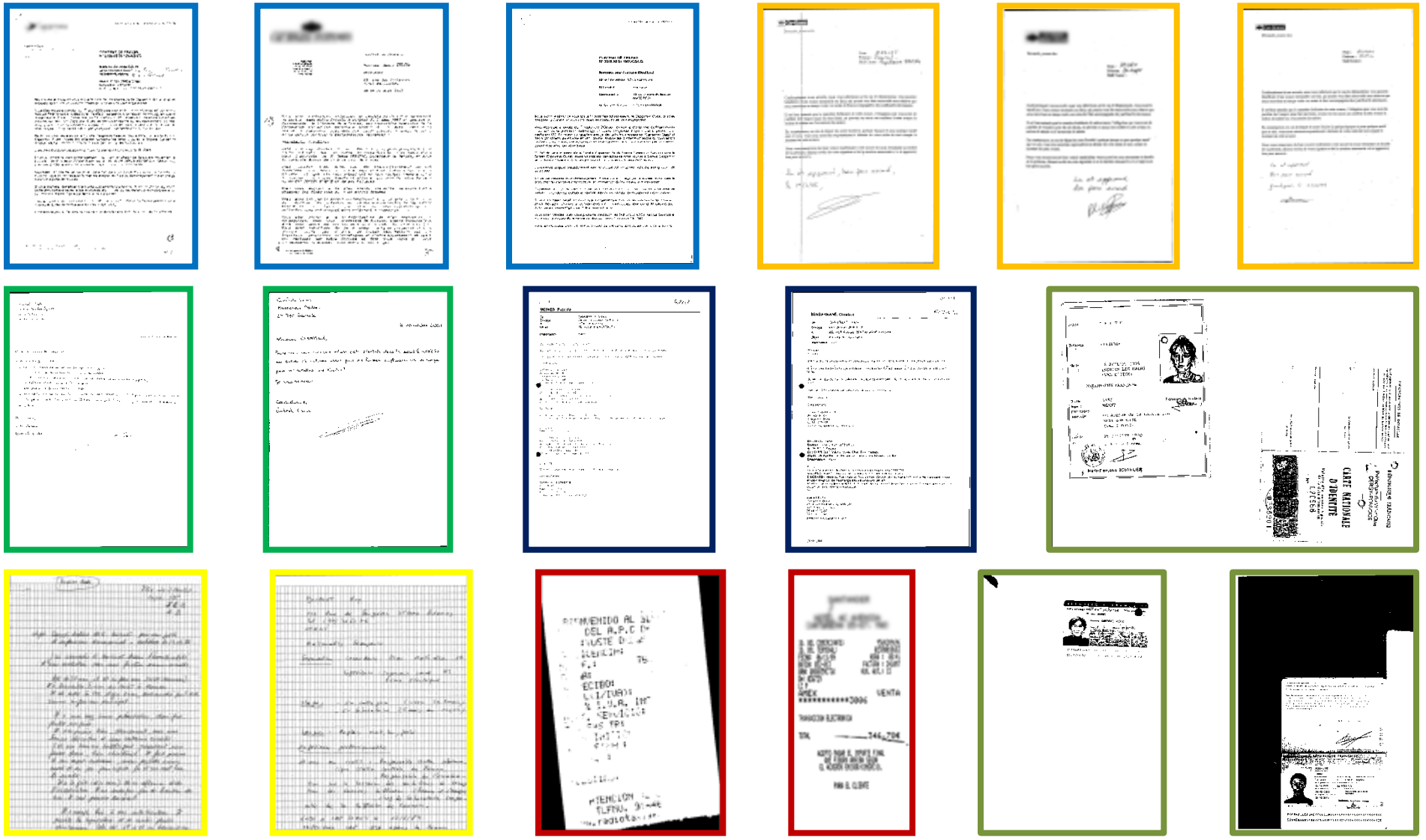
TC10 Technical Committee on Graphics Recognition

2011 ICDAR Doctoral Consortium

IAPR

TC-11 Reading Systems

Goal



TC10
Technical Committee on
Graphics Recognition

2011 ICDAR
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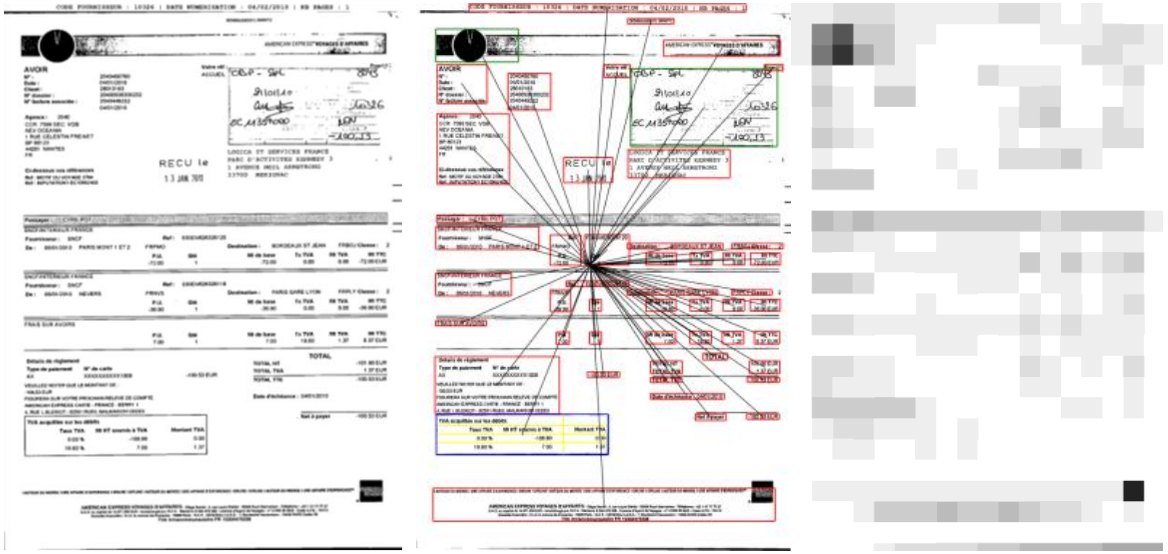
IAPR

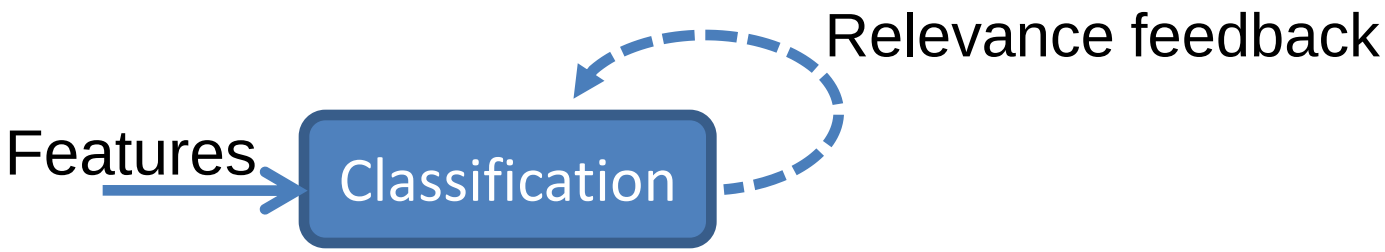
TC-11
Reading
Systems

Progress to date



Automatic features extraction

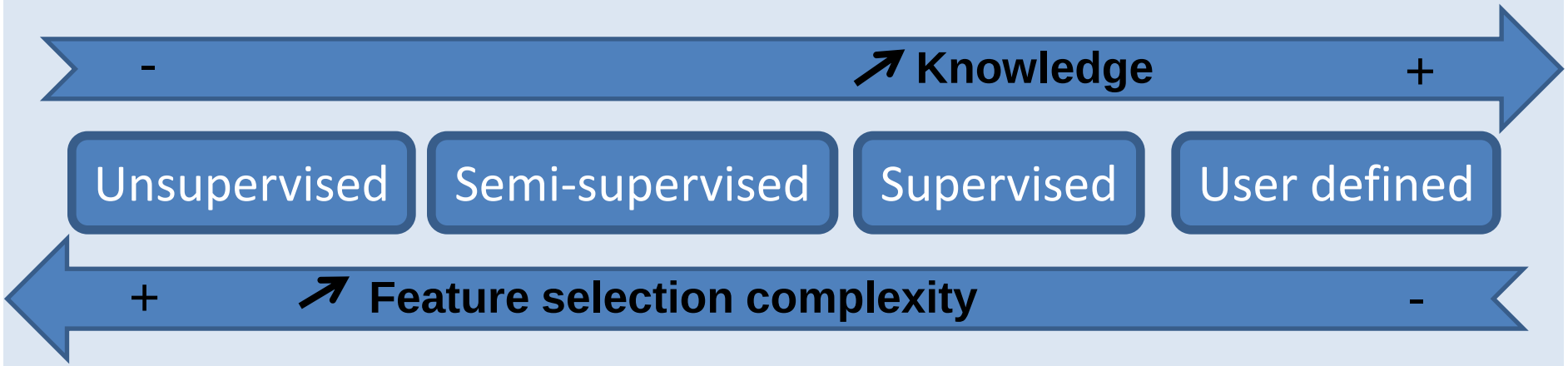
User selection



Open problems

Descriptors : Text ? Structure ? Image ? Mix ?

Classifiers :



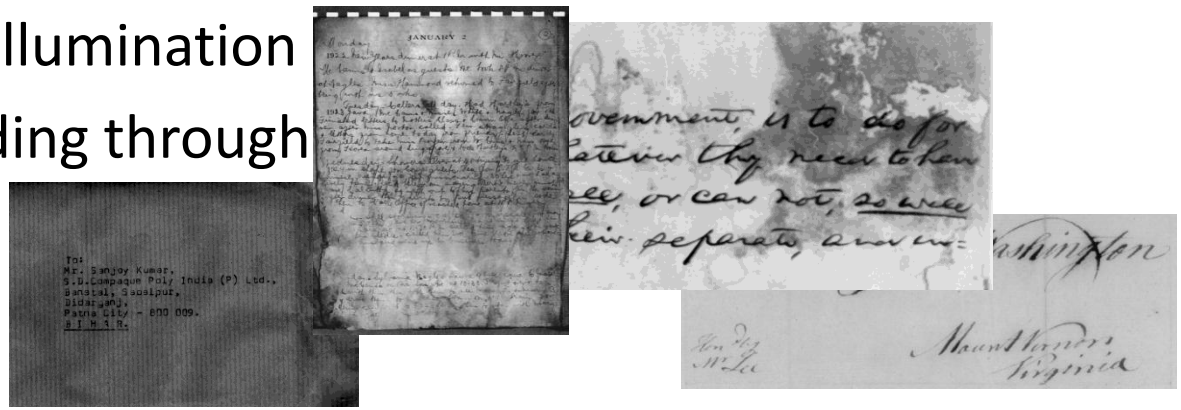
Optimize : information quantity, classification time, recall and precision.

Document Image Enhancement

Bolan Su
National University of Singapore
Advisor: Prof. Tan Chew Lim
Dr. Lu Shijian

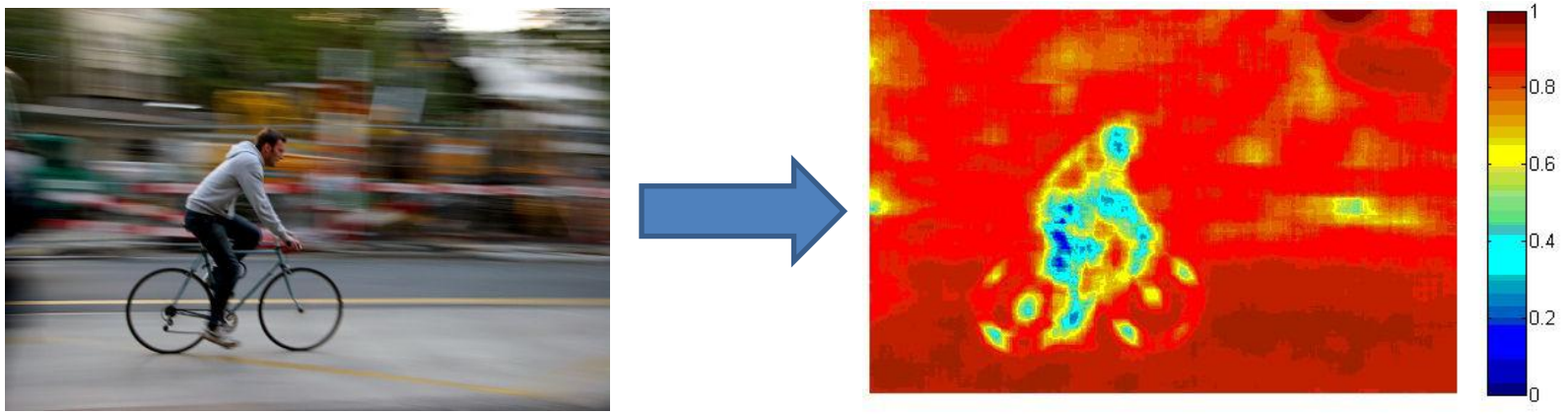
Document Image Binarization

- Document Image Binarization is to cover a gray-scale document image into a binary version for ensuing document analysis tasks.
- Challenges
  - Different types of document degradations
    - Uneven illumination
    - Ink bleeding through
    - Smear
    - etc…



Document Image Deblurring

- **There exists blur in many digital images due to motion or out-of-focus. Sometimes blur is produced by the photographer to strengthen expressive of the photo, but the unintentional blur will decrease the image quality, which is caused by incorrect focus, object motion, hand shaking and so on**
- **Blurred Region Detection and Classification**



- **Restoration of Blurred Document Images**
  - **The gradient distributions of blurred nature images and blurred document images are different**

Conclusions

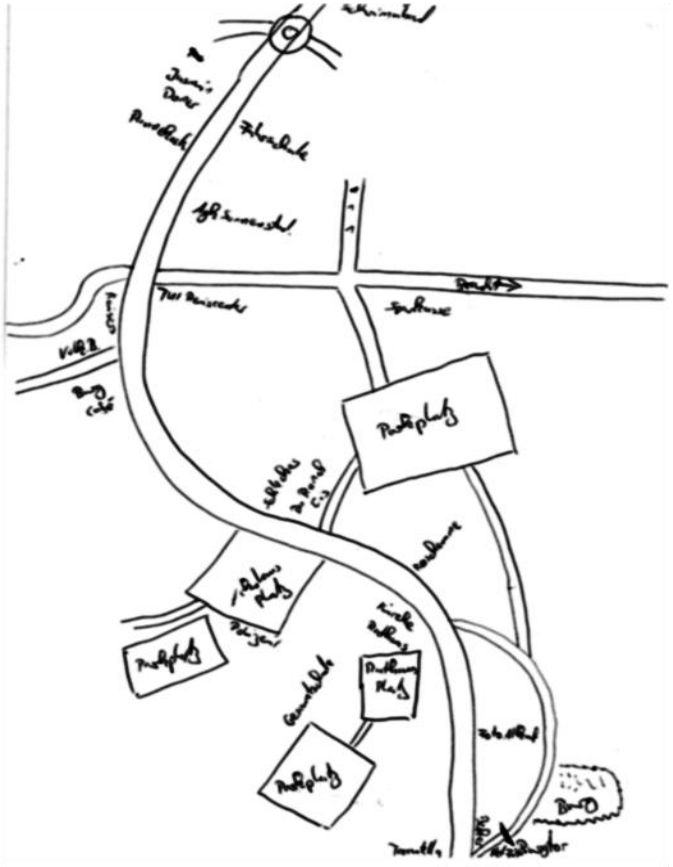
- The document image enhancement techniques improve the document image quality not only to enhance human perception, but also facilitate subsequent automated image processing.
  - Document Image Binarization
  - Document Image Deblurring

Automatic understanding of sketch maps

Klaus Broelemann
University of Münster, Germany
Advisor: Prof. Dr. Xiaoyi Jiang

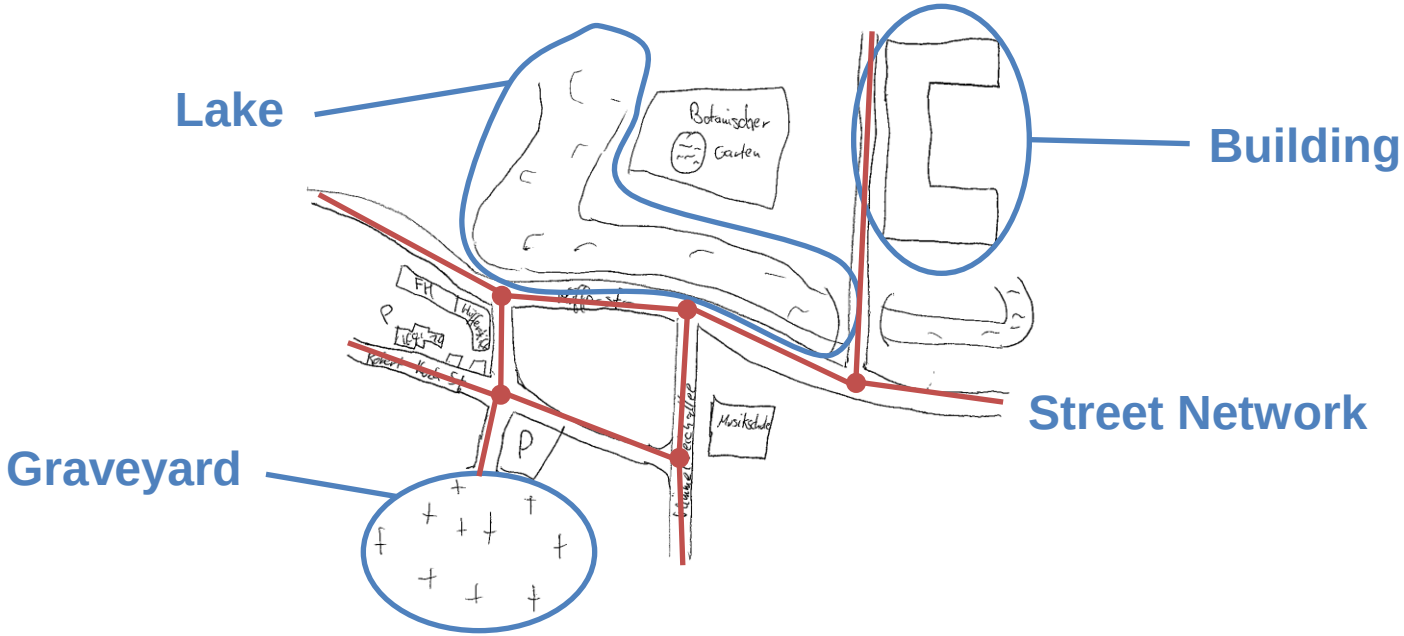
Motivation

- Sketch maps
  - Hand drawn maps
  - No metric maps
  - Intuitive to use for people
- Automatic sketch map understanding
  - Intuitive human-computer-interaction



Goal of the work

Automatic offline semantic recognition and integration of objects in images of hand-drawn sketch maps



Conclusions

- Detection and recognition of sketch map objects
- If you are interested in details:

Come and visit my poster

Thank you!

Generic Layout Analysis of Diverse Collection of Documents

Syed Saqib Bukhari
Technical University of Kaiserslautern, Germany
bukhari@iupr.com

Advisor: Prof. Thomas M. Breuel

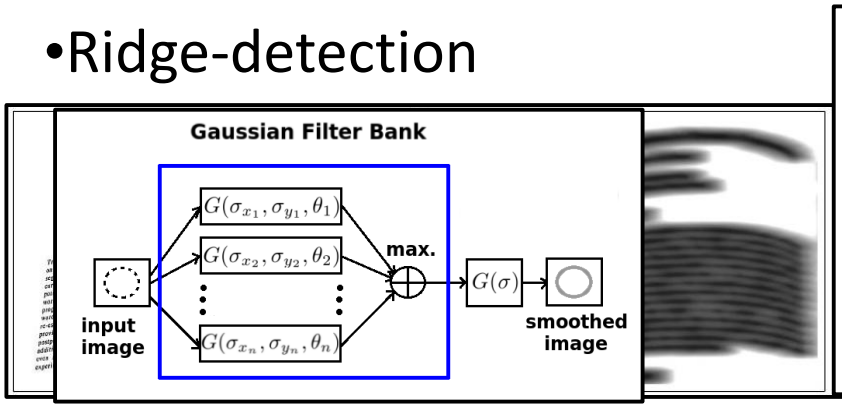
Generic Layout Analysis

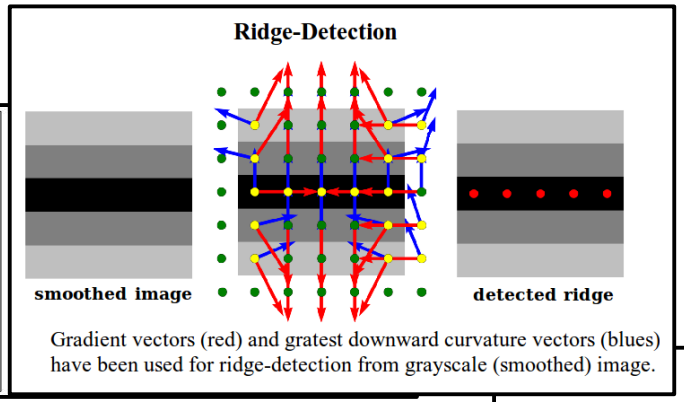
- **Diverse Collection of Documents**

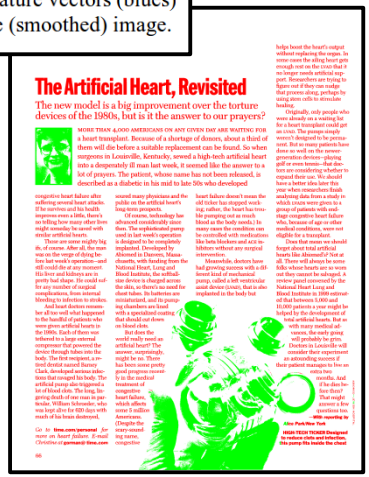
- **Text-line** is the dominant **geometrical layout structure** for **diverse collection of documents**.
- A large number of **domain specific text-line extraction** methods are available.
- A **generic text-line extraction** method can be applied equally on diverse collection of documents.

Contributions: Generic Layout Analysis

- **A Generic Text-Line Extraction Method:**
  - It is based on: [ICDAR09, ICIP09, ICDAR11]
    - Filter bank smoothing
    - Ridge-detection



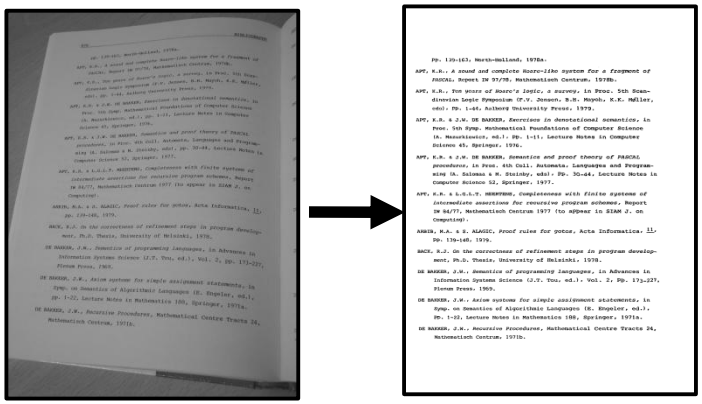




- **Text and Non-Text Segmentation:**
  - Multiresolution Morpholoy [DRR11]
  - Discriminative Learning [DAS10]

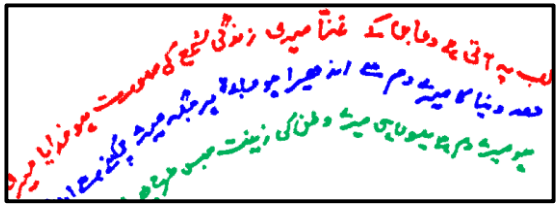
Contributions: Applications

- **Preprocessing of Camera Captured Documents**
  - Binarization [CBDAR09, JUCS09]
  - Page Frame Detection [CBDAR11]
  - Monocular Dewarping [CBDAR09]



- **Layout Analysis of Complex Scripts Documents** [ICDAR11, Springer11]

- **Text-Line Extraction of Handwritten/Historical Documents** [ICDAR09]



Effects of Artificial Sample Generation Models for On-line Handwritten Japanese Character Recognition

Bin Chen
Tokyo University of Agriculture and Technology
Advisor: Chen-lin Liu

Flow chart of On-line handwritten recognition

pair of contradictions

The shortage of training sample data

Requirement of Achieve higher recognition performance

resource cost

It is time consuming and costly to prepare a large database

- Low cost
- High ratio of effective

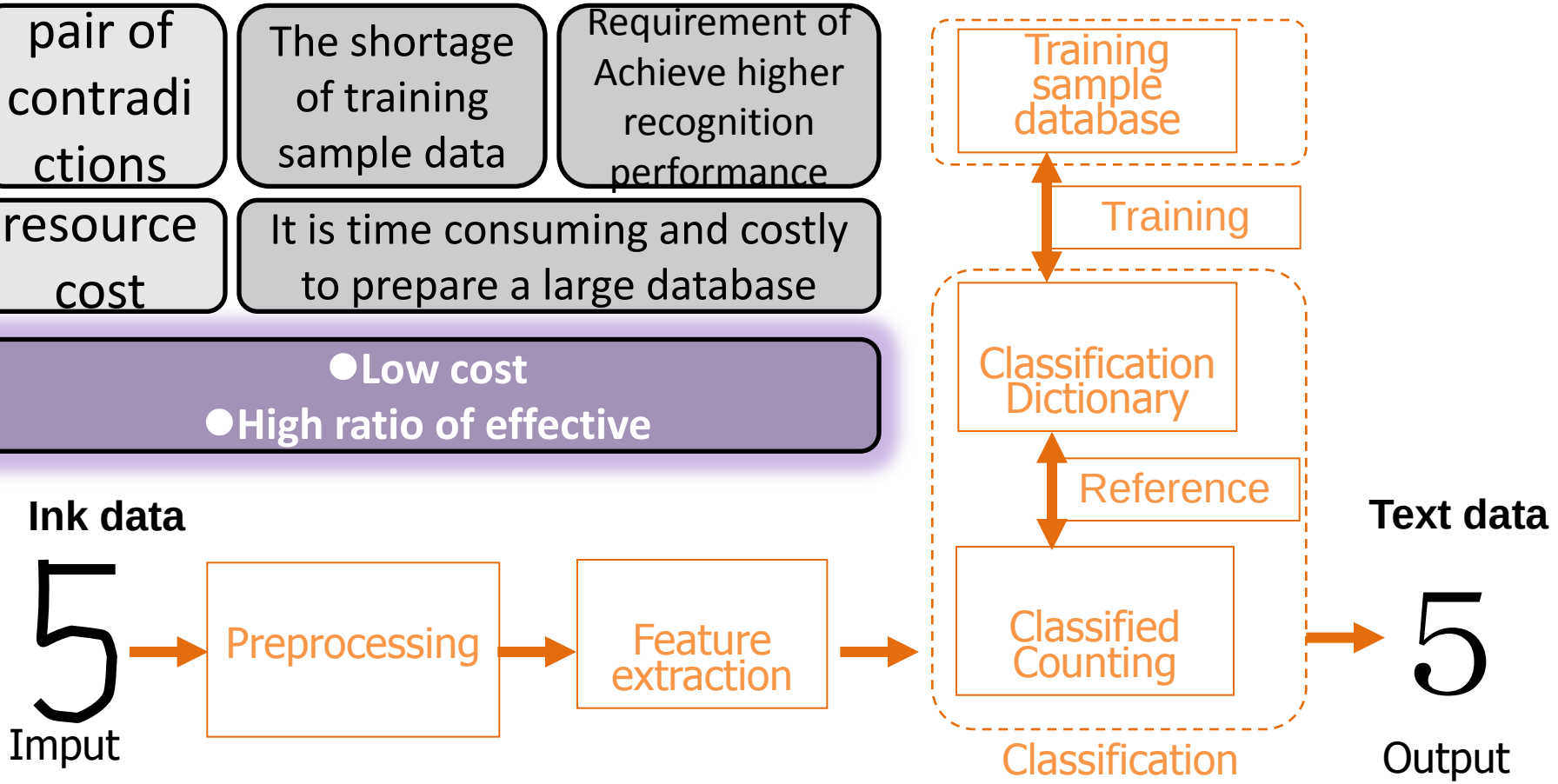
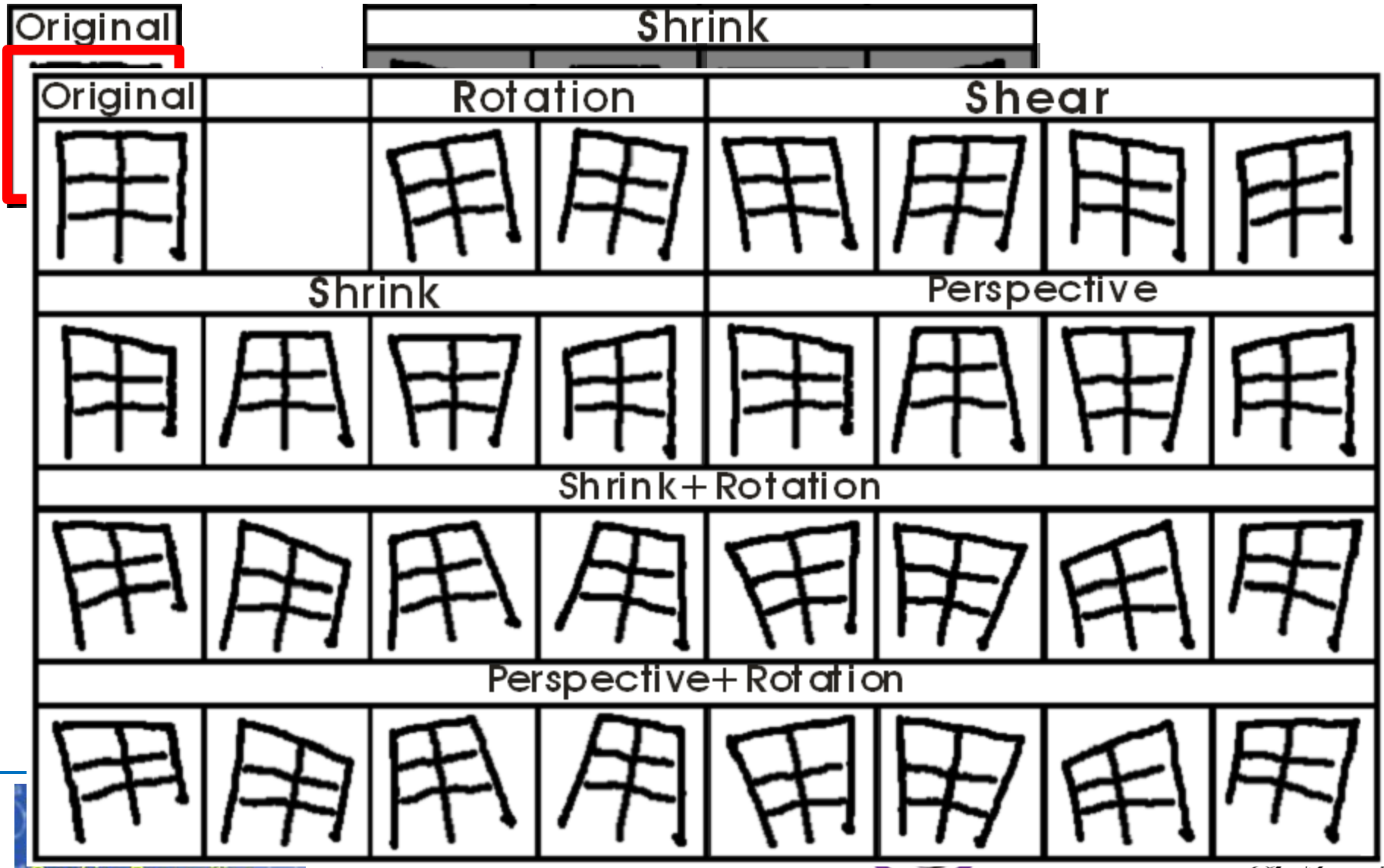


illustration formDistortion Models

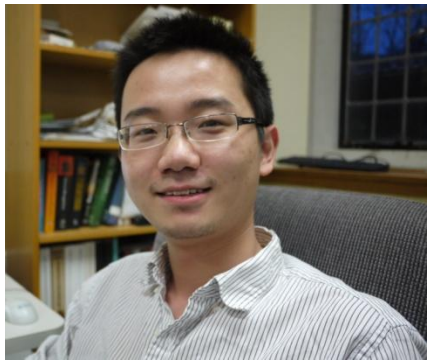


Conclusions & Future work

- Conclusions--Created 6 LDM & 1 NLDM
  - Test on Kuchibue database, Recognition rate of Kanji:
    - LDM 94.84% → 95.79% 0.95%↑
    - LDM+NLDM 94.84% → 95.94% 1.10%↑
- Future work
  - Consummate the experiment
  - Apply sigma Log-normal model, to construct a generative model base on the structural characteristics of characters.

Exploiting Metadata for Off-line Handwritten Document: Modeling and Applications

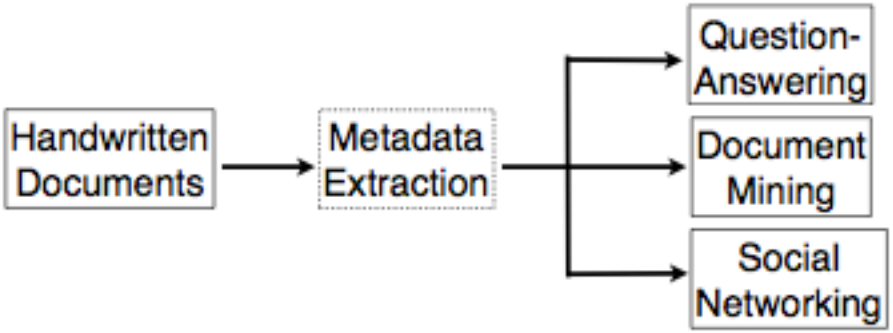
Jin Chen
Lehigh University
Advisor: Daniel Lopresti
Mentor: Marcus Liwicki



Motivation and Hypothesis

- Document image analysis (DIA) is the subfield of digital image processing that aims at converting document images into a symbolic form for modification, storage, retrieval, reuse, and transmission [Nagy, 2000].
- However, more information is conveyed in addition to such a transcription, e.g., writer idiosyncrasies, data arrangement.
- By exploiting various metadata, I hypothesize that we can restore the original structure between documents, build new relations from them, and facilitating problem solving in information retrieval tasks.

Exploiting Metadata

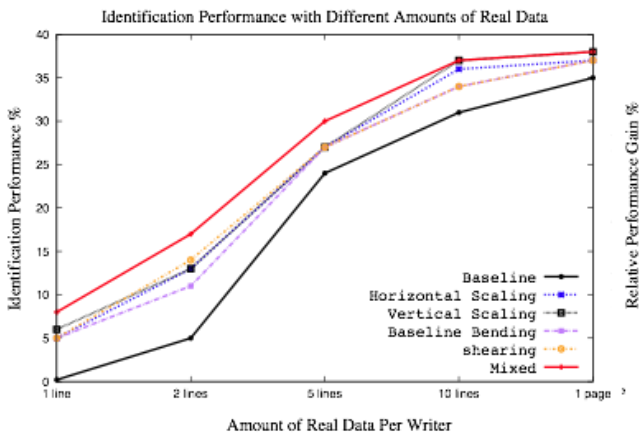


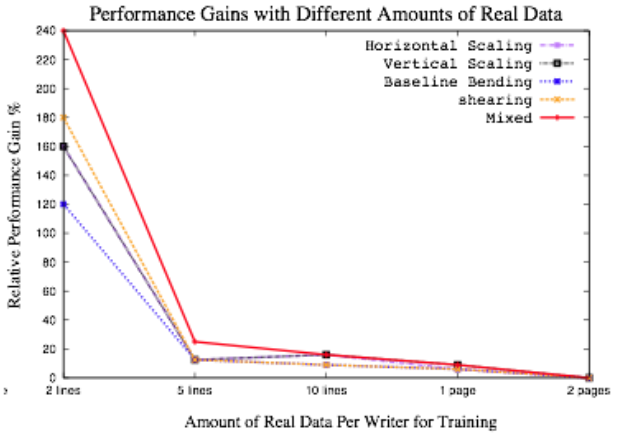
- *Structural Metadata*: data arrangement, etc.
- *Descriptive Metadata*: writer idiosyncrasies, pre-printed ruling line specifications, etc.

So far I have been working on:

- Table analysis in noisy handwritten documents.
- Writer ID under severe data constraints.
- Model-based ruling line detection.

Experimental Results





In addition,

- We have proposed an algorithm for ruling line detection.
- We have proposed an algorithm for table detection in noisy handwritten documents.

For details, please come to my poster.

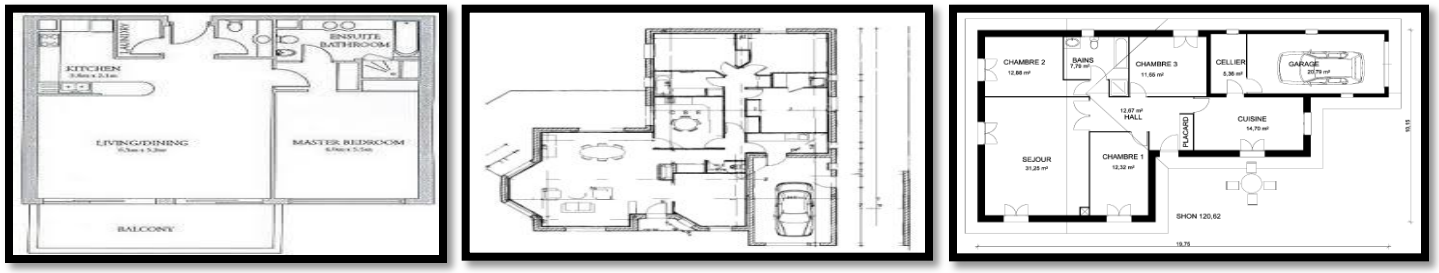
Syntactic Model for Semantic Document Analysis

Lluís-Pere de las Heras
Computer Vision Center - Universitat Autònoma de Barcelona
Advisor: Gemma Sánchez

Introduction

Problem:

Floorplan interpretation is a non-solved problem due to there is not a standard notation.



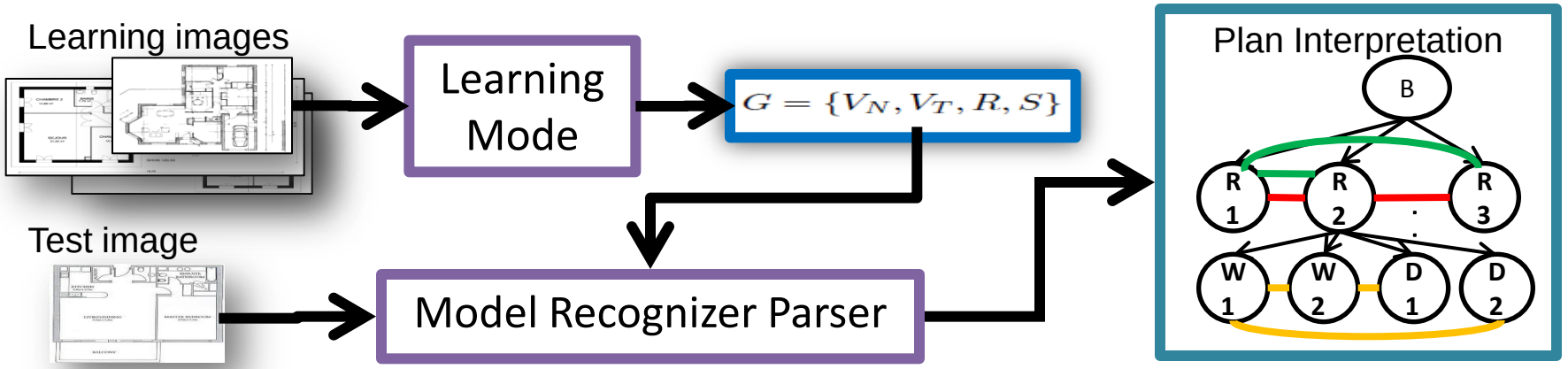
Aim:

- Syntactic approach that takes into account the hierarchical, structural and semantic information to interpret floorplans.
- Floorplan interpretations indexed to be retrieved accordingly to the hierarchic, structural and semantic user queries.

Syntactic Model for floorplan interpretation

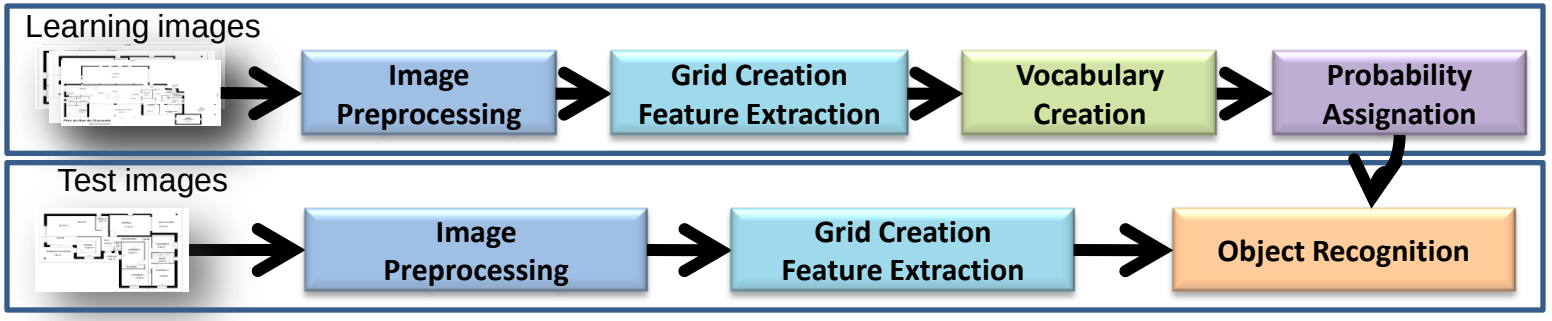
- **Learning Model:**
- SCFG visual grammar over And-Or Graph.
- **Model Recognition:**
- Bottom-Up/Top-Down Parser.
- Probabilistic and Semantic Pruning.

- **Floorplan Interpretation:**
- Hierarchical, structural and semantic interpretation.
- Interpretation at different levels of abstraction.
- **Problems:**
- Primitive extraction dependant.
- Supervised and notation-oriented



Component Extraction Methods

- **Wall Patch-based Segmentation in Architectural Floorplans (ICDAR '11)**



- **Descriptor-based Wall Detector on Floorplans (GREC '11)**

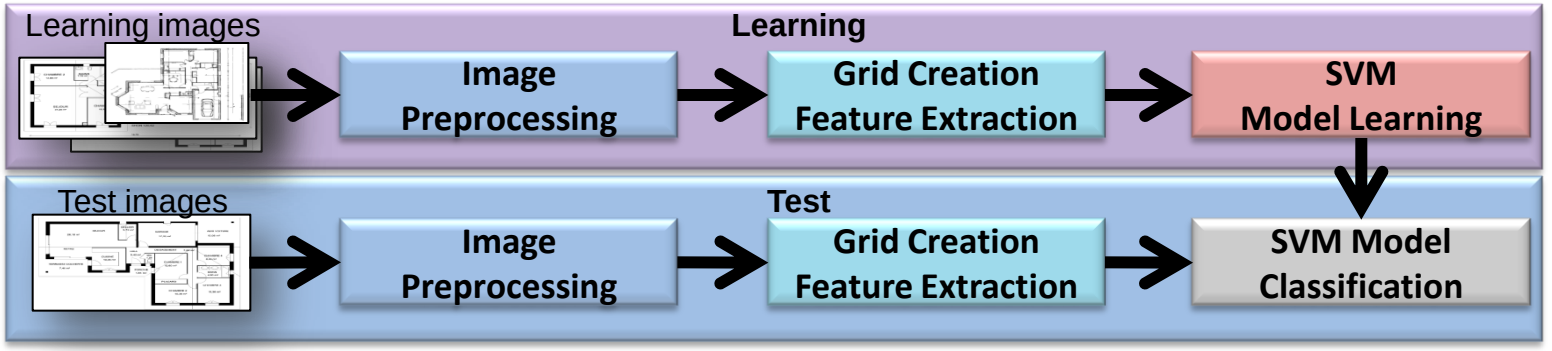
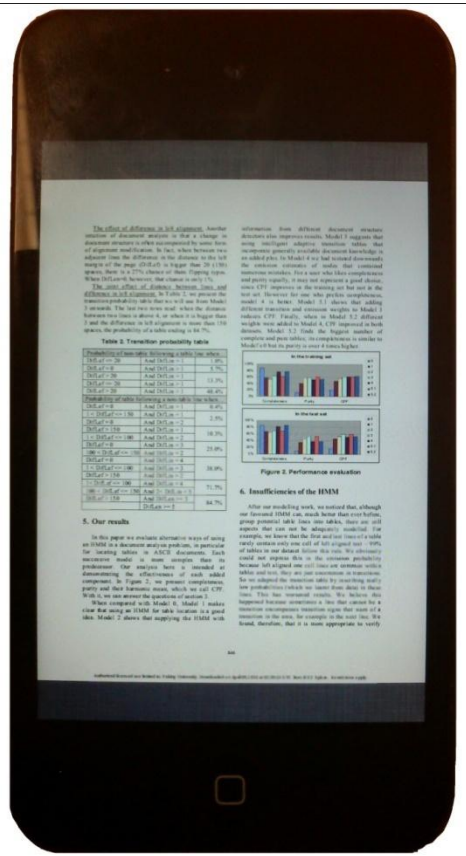
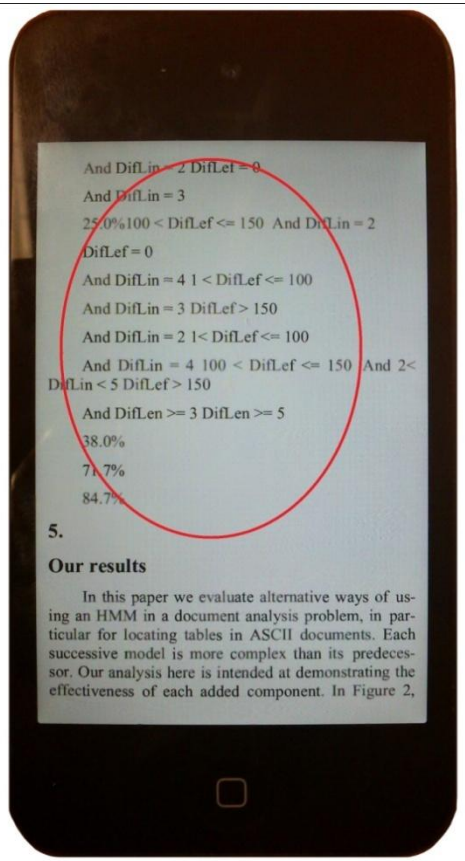


Table Recognition and Evaluation in PDF Documents

Jing Fang
Peking University
Advisor: Zhi Tang

Motivation: Mobile Reading





And DifLin = 2 DifLef = 0

And DifLin = 3

25.0%100 < DifLef <= 150 And DifLin = 2

DifLef = 0

And DifLin = 4 1 < DifLef <= 100

And DifLin = 3 DifLef > 150

And DifLin = 2 1< DifLef <= 100

And DifLin = 4 100 < DifLef <= 150 And 2< DifLin < 5 DifLef > 150

And DifLen >= 3 DifLen >= 5

38.0%

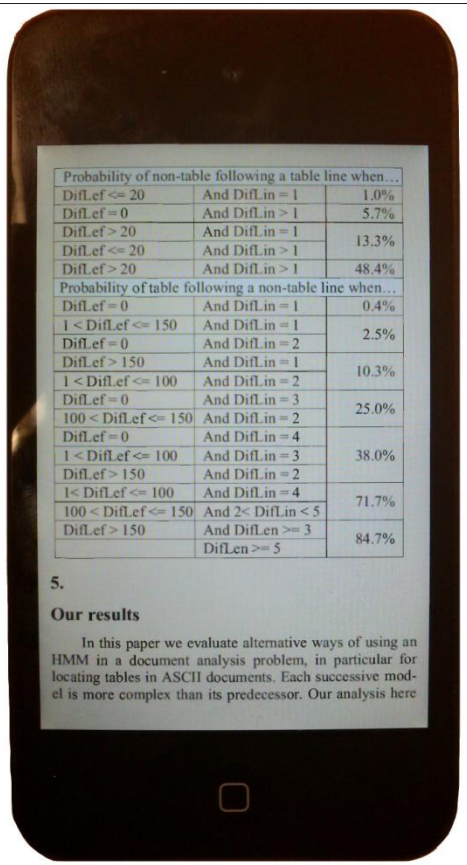
71.7%

84.7%

5.

Our results

In this paper we evaluate alternative ways of using an HMM in a document analysis problem, in particular for locating tables in ASCII documents. Each successive model is more complex than its predecessor. Our analysis here is intended at demonstrating the effectiveness of each added component. In Figure 2,



Probability of non-table following a table line when…		
DifLef <= 20	And DifLin = 1	1.0%
DifLef = 0	And DifLin > 1	5.7%
DifLef > 20	And DifLin = 1	13.3%
DifLef <= 20	And DifLin > 1	
DifLef > 20	And DifLin > 1	48.4%
Probability of table following a non-table line when…		
DifLef = 0	And DifLin = 1	0.4%
1 < DifLef <= 150	And DifLin = 1	2.5%
DifLef = 0	And DifLin = 2	
DifLef > 150	And DifLin = 1	10.3%
1 < DifLef <= 100	And DifLin = 2	
DifLef = 0	And DifLin = 3	25.0%
100 < DifLef <= 150	And DifLin = 2	
DifLef = 0	And DifLin = 4	38.0%
1 < DifLef <= 100	And DifLin = 3	
DifLef > 150	And DifLin = 2	
1< DifLef <= 100	And DifLin = 4	71.7%
100 < DifLef <= 150	And 2< DifLin < 5	
DifLef > 150	And DifLen >= 3	84.7%
	DifLen >= 5	

5.

Our results

In this paper we evaluate alternative ways of using an HMM in a document analysis problem, in particular for locating tables in ASCII documents. Each successive model is more complex than its predecessor. Our analysis here

Proposed Plan

- Table detection
  - "A Table Detection Method for Multipage PDF Documents via Visual Separators and Tabular Structures"

Poster Session 2, #29
Time: September 20 (Tuesday) 13:40-15:20
Location: Ballroom of Friendship Palace

Investigations on the use of linear-chain CRF based method to segment old newspapers

David Hebert
University of Rouen
Advisor: Thierry Paquet

Context

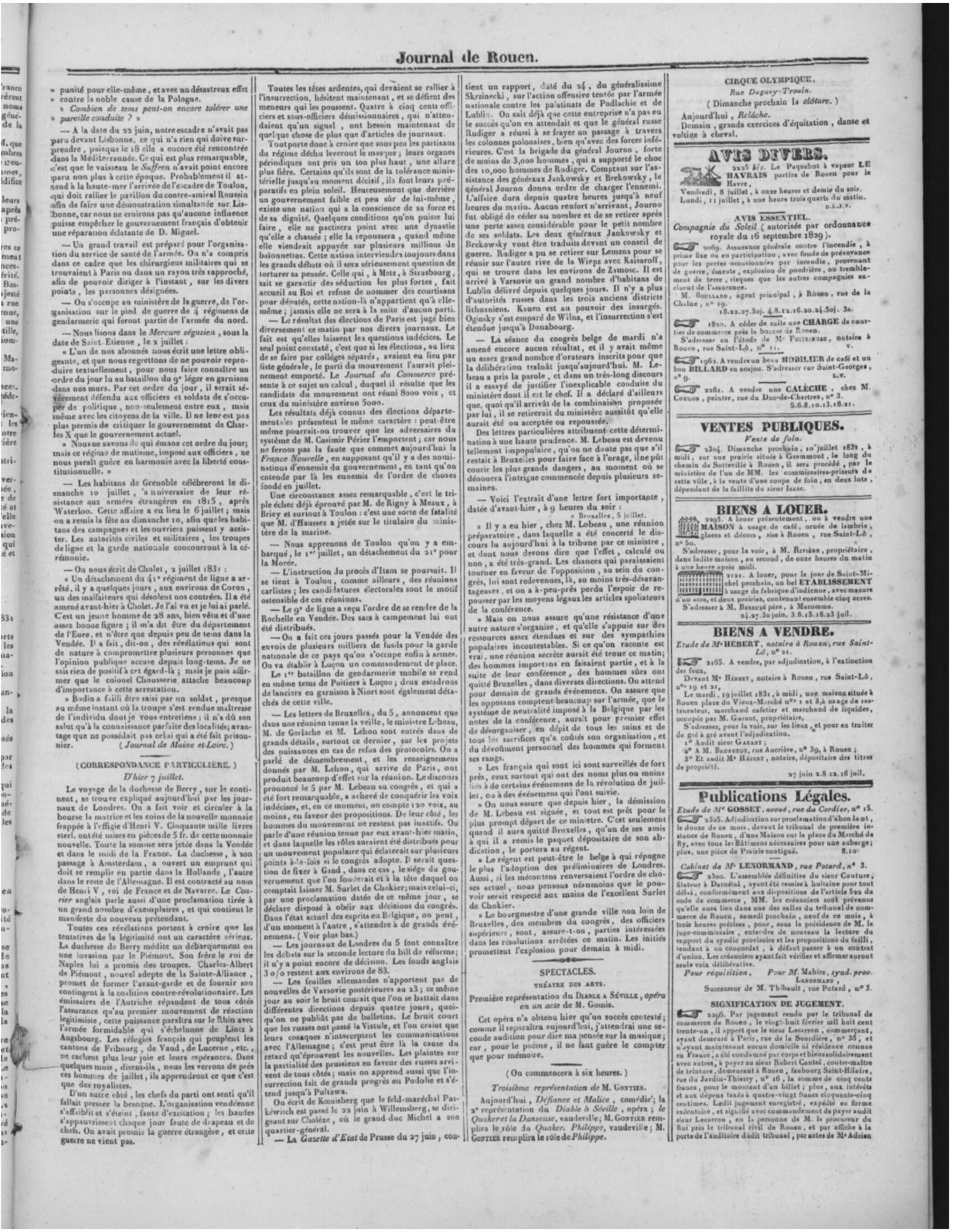
- In a project context, we want to extract articles in old newspapers
- The LITIS laboratory has skills in pattern recognition and machine learning

=> Use these machine learning skills to segment newspaper images

Details

- Train a system to identify some entities in a document
- Taking advantage of document images

- HMM/ (linear-chain) CRF based method to solve a 2D segmentation problem


Journal de Rouen.

CIRQUE OLYMPIQUE.

AVIS DIVERS.

VENTES PUBLIQUES.

BIENS A LOUER.

BIENS A VENDRE.

Publications Légales.

(CORRESPONDANCE PARTICULIÈRE.)

SPECTACLES.

TC10 Technical Committee on Graphics Recognition

2011 ICDAR Doctoral Consortium

IAPR

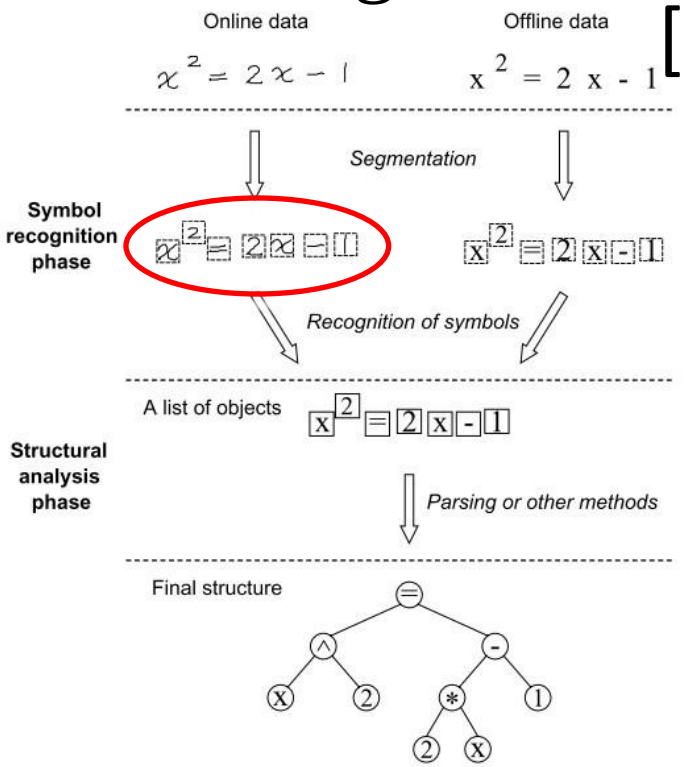
TC-11 Reading Systems

Recognition and Retrieval of Handwritten Mathematical Expressions

Lei Hu
Rochester Institute of Technology
Advisor: Richard Zanibbi

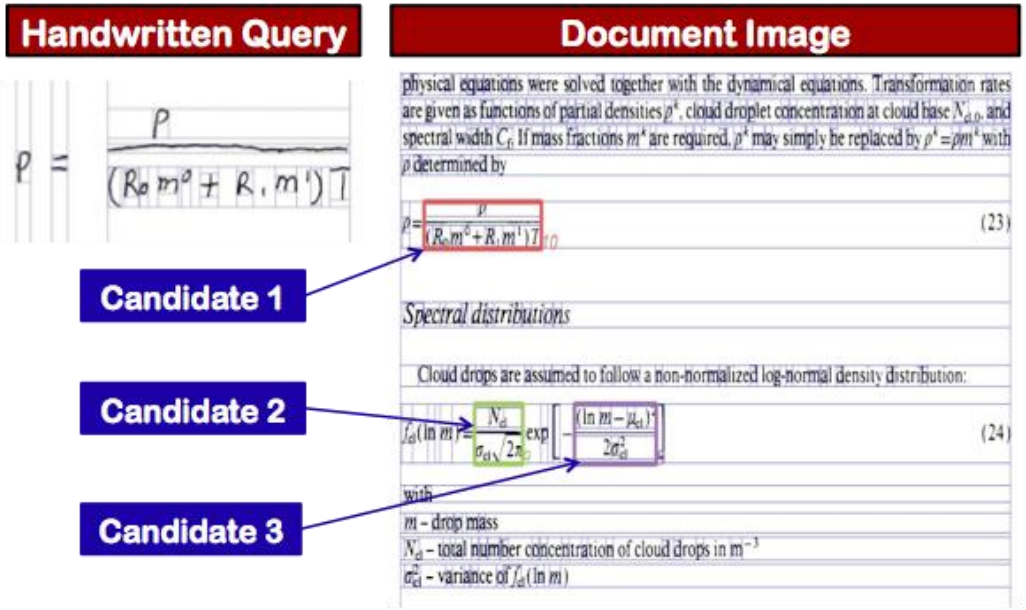
System Overview

Recognition



[1]

Retrieval

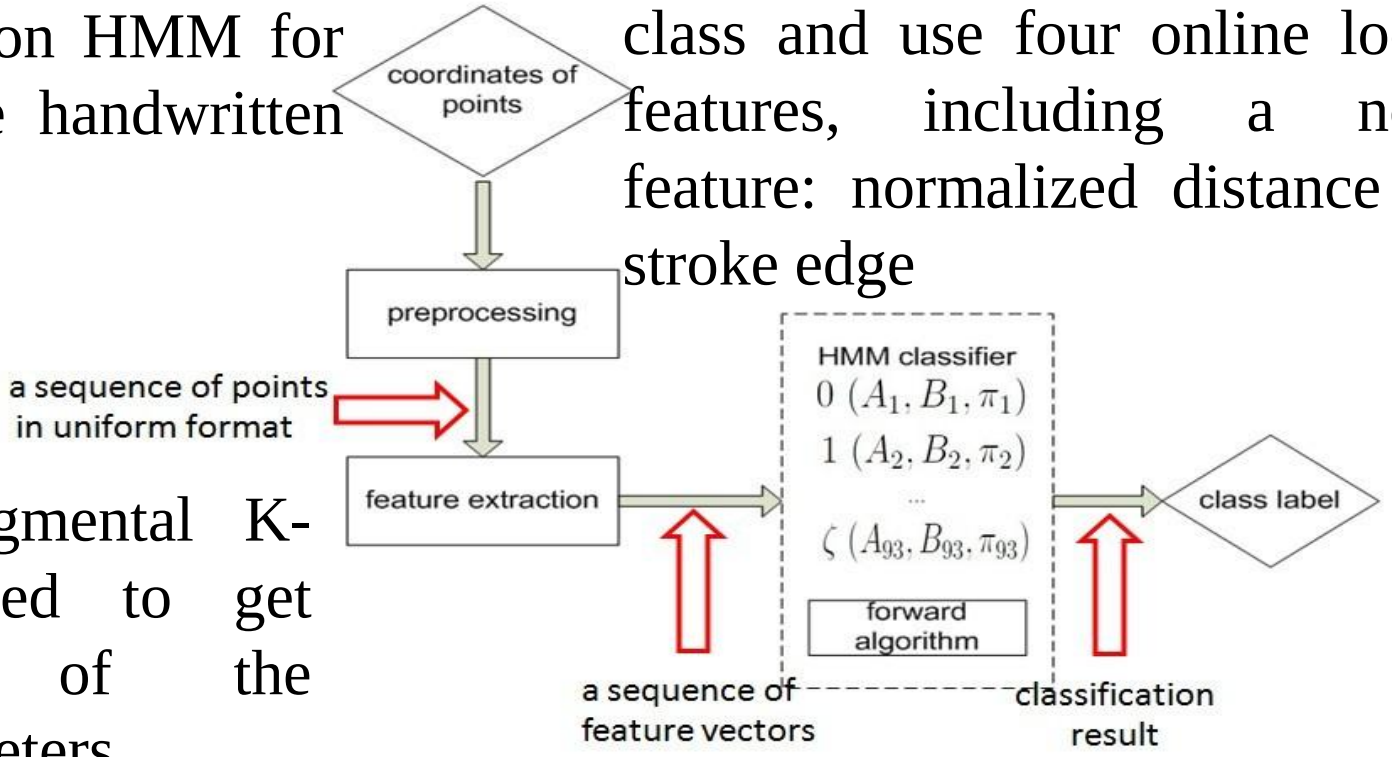


[1] K.-F. Chan and D.-Y. Yeung, “Mathematical expression recognition: a survey,” International Journal on Document Analysis and Recognition, vol. 3, no. 1, pp. 3–15, Aug. 2000.

Recognition of Online Handwritten Math Symbols

We build a recognition system based on HMM for isolated online handwritten math symbols

We design a continuous left to right HMM for each symbol class and use four online local features, including a new feature: normalized distance to stroke edge

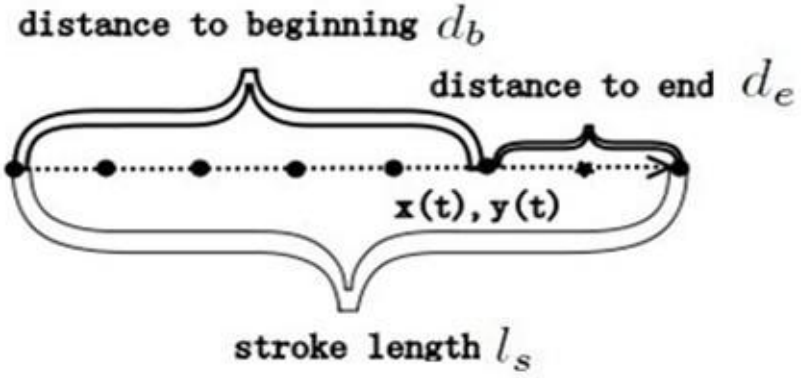


A variant segmental K-means is used to get initialization of the GMM's parameters

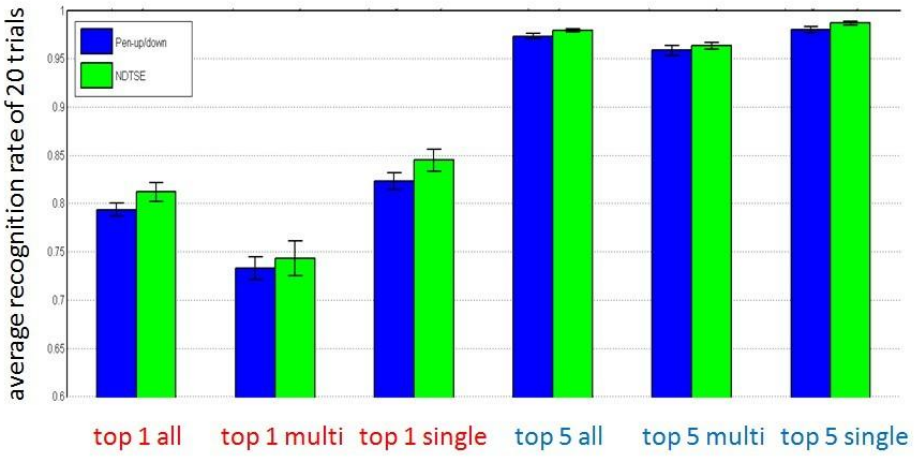
Modified Pen-up/down Feature

Pen-up/down ⇒ Normalized distance to stroke edge (NDTSE)

$$NDTSE(s,t) = \begin{cases} 1 - \frac{|d_e - d_b|}{l_s}, & \text{for actual stroke} \\ -(1 - \frac{|d_e - d_b|}{l_s}), & \text{for interpolated stroke} \end{cases}$$



Comparison of average recognition rate and standard deviation between using NDTSE and Pen-up/down

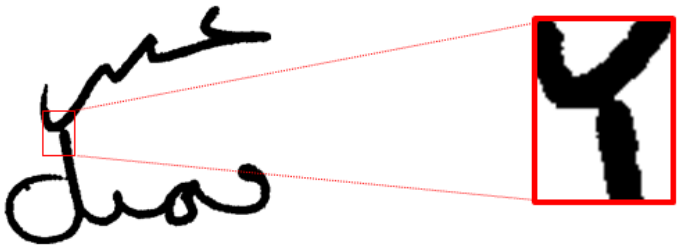


Touching Text Segmentation and Shape Analysis

Le Kang
University of Maryland, College Park
Advisor: David Doermann

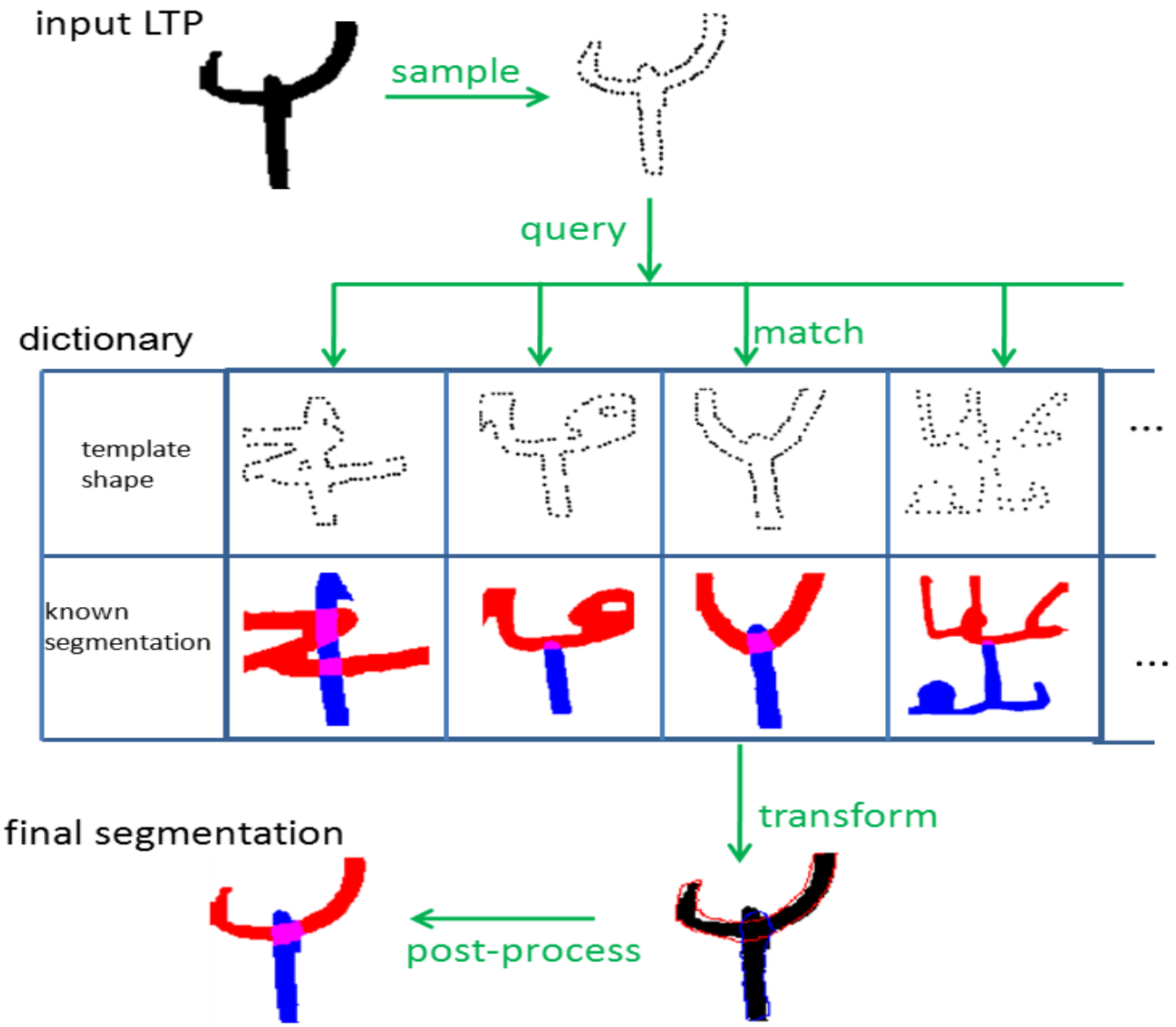
Background

- Problem
  - Text touching in text line segmentation



Local Touching Pattern (LTP)

- Challenge
  - General solution for multiple languages and fonts
- Potential approaches
  - Machine learning based methods
  - Prior knowledge / heuristics


input LTP
sample
query
dictionary
match
template shape
known segmentation
...
...
transform
final segmentation
post-process

Conclusion and future work

- Template matching based segmentation
  - Pros: effective and extensible
  - Cons: high computational cost
- Incorporate prior knowledge
  - General constraints of shapes
  - Stroke level properties

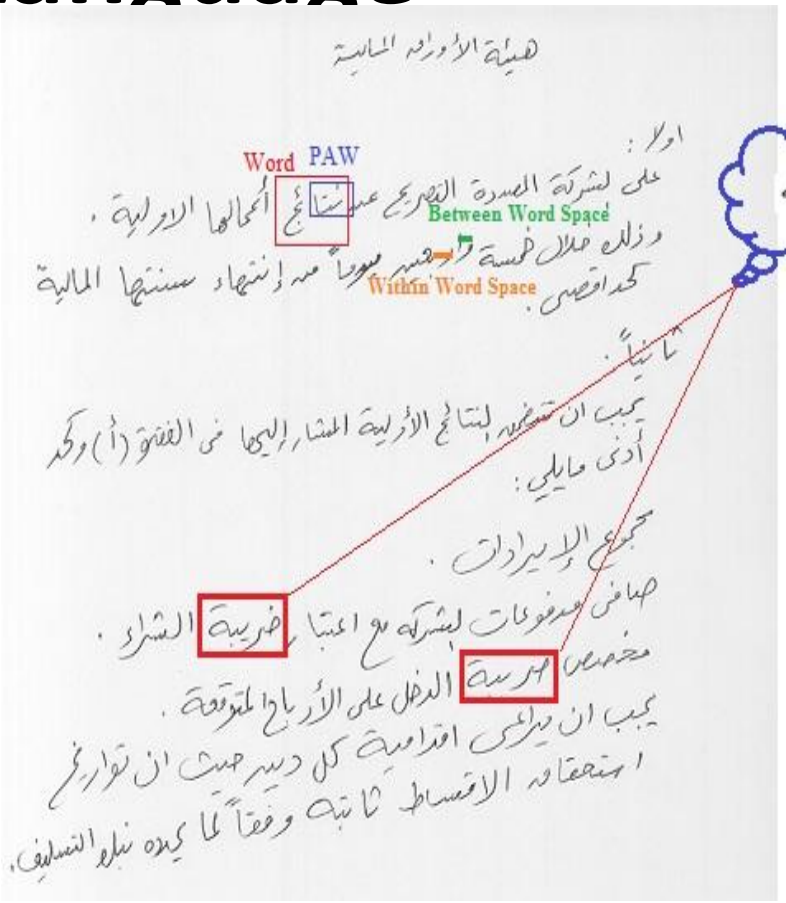
Learning Based Word Spotting for Arabic Handwritten Documents Using Hierarchal Classifier

Muna Khayyat (PhD Student , 3rd year)
Concordia University

Advisors: Dr. C. Y. Suen
Dr. L. Lam

The problem with Word Spotting for Arabic Language

- *P*ieces of *A*rabic *W*ords (PAW)
- Identical white space between and within words
- This makes the word boundaries are arbitrary or non existing
- Thus, ***word spotting*** for Arabic handwriting is challenging

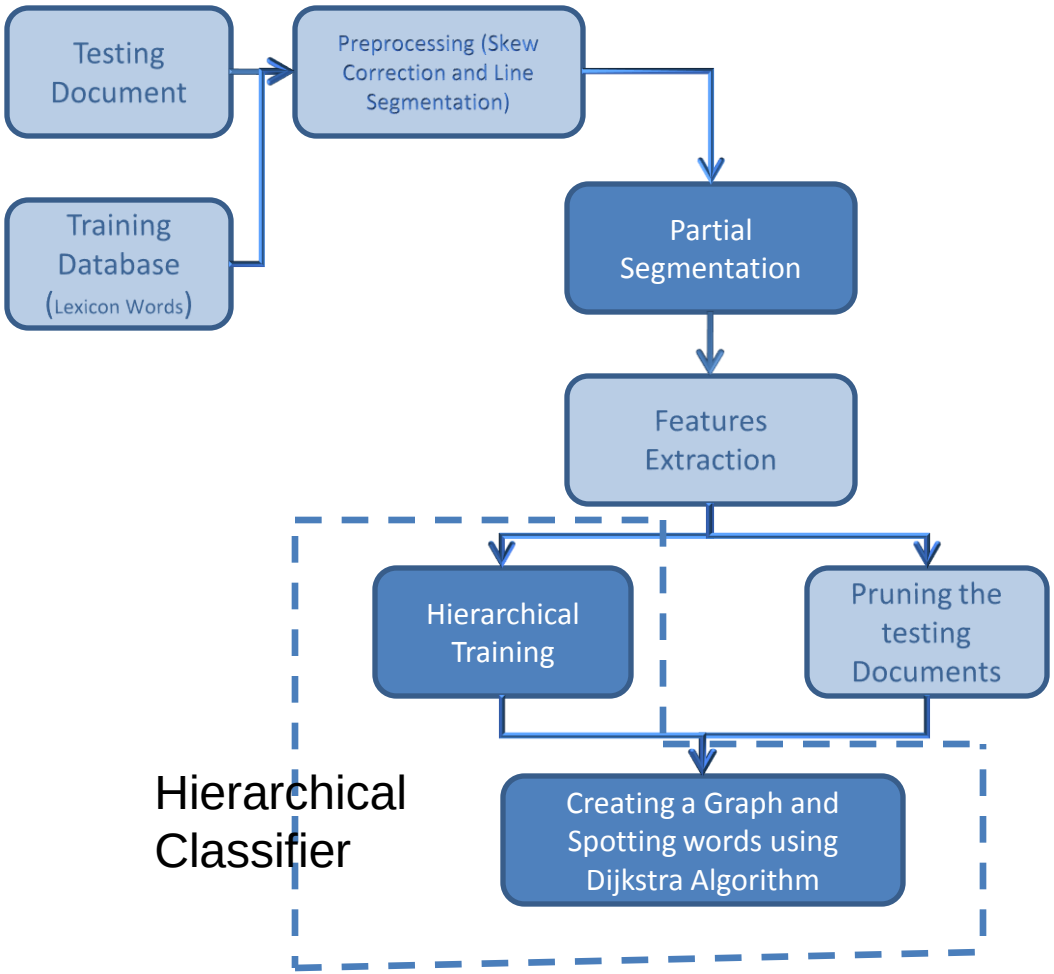


Research Plan and Methodologies

– Partial Segmentation

– Hierarchal Training

– Word Spotting



Conclusions

- A learning based system for Arabic handwritten word spotting
- Partial segmentation
- A hierarchical classifier to solve the boundary problem
- Use the Dijkstra algorithm to detect words and make the final matching decision

Adaptive Methods for Robust Document Image Understanding

PhD Candidate: Iuliu Konya
Fraunhofer IAIS/University of Bonn, Germany

Fraunhofer IAIS

universitätbonn
RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT

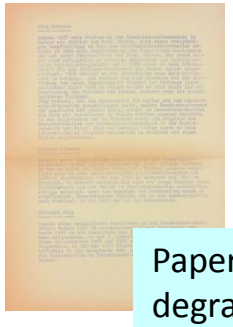
First Examiner: Prof.Dr. Christian Bauckhage (Fraunhofer IAIS/Univ. Bonn)
Second Examiner: Prof.Dr. Michael Clausen (Univ. Bonn)
Advisor: Dr. Stefan Eickeler (Fraunhofer IAIS)

September 23, 2011

Context& Research Goals

- Question: Can **(semi-)automated** document image analysis (DIA) algorithms be developed so as to allow a **satisfactorily processing** of heterogeneous **real-life complex document** collections?

Research Overview

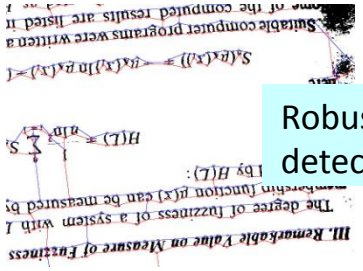


Quality assessment

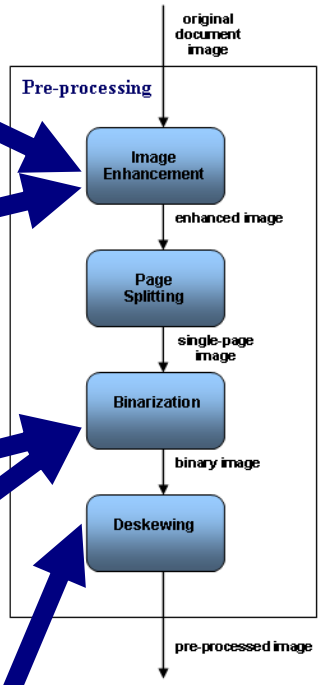
Paper degradation& artifact removal

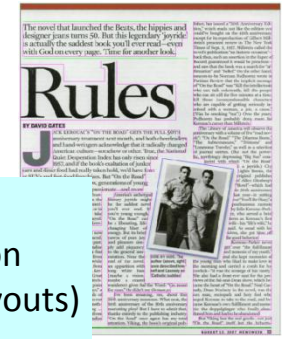
Real-time adaptive binarization

Color reduction

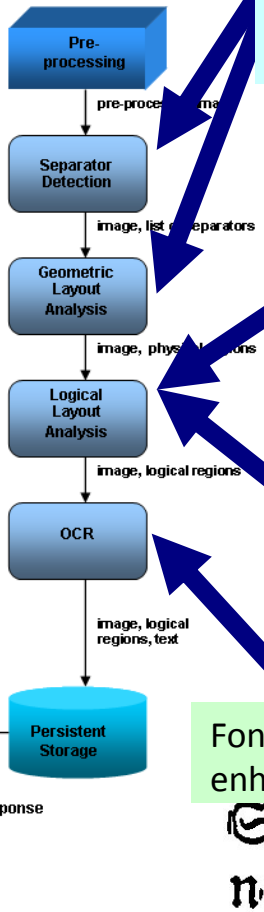


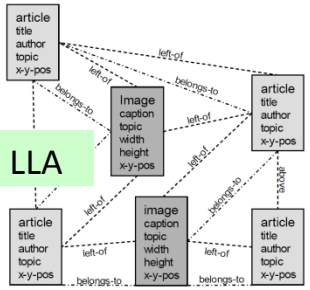
Robust skew detection





Page segmentation (complex layouts)

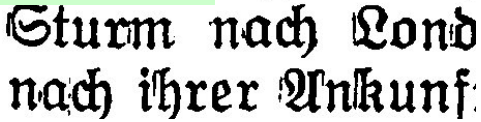




Trainable LLA

Front page detection

Font enhancement



Conclusion& Future work

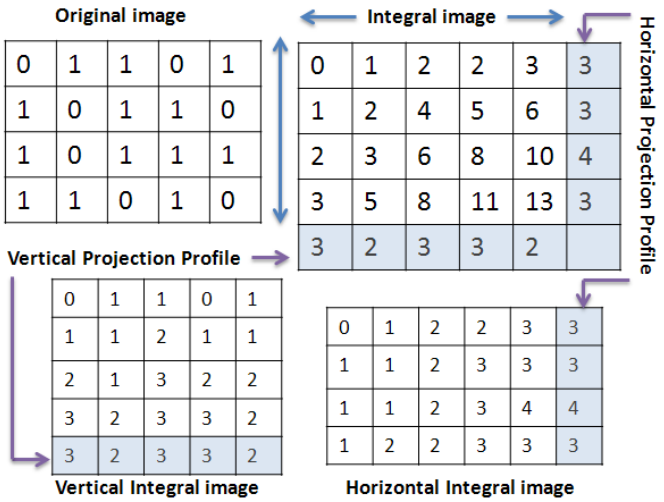
- Proposed approaches work reasonably well, but overall results can still be greatly improved:
  - better use of color information (historical documents vs magazines)
  - automatic (rough?) quality assessment for geometric-& logical layout analysis
  - scalable, trainable LLA minimizing human input
  - …

Segmentation and Labeling of Mixed-type Noisy Handwritten Documents

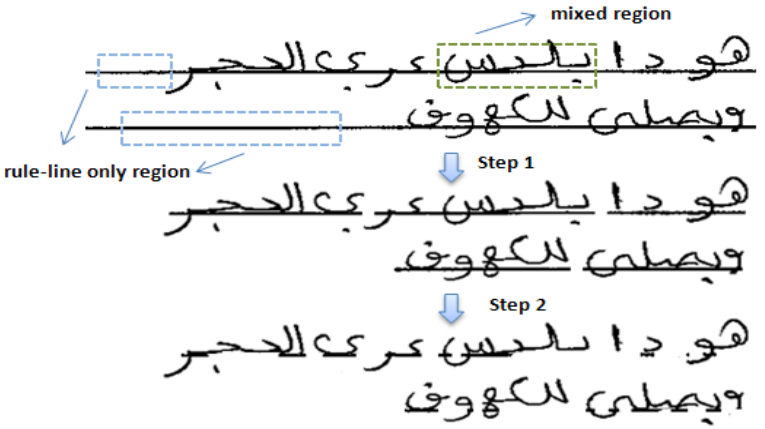
Jayant Kumar
University of Maryland College Park
Advisor: David Doermann

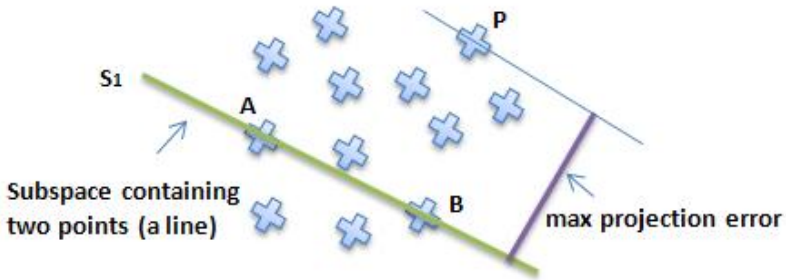
Introduction – Research Highlights

1 Document Image Enhancement



Integral Images

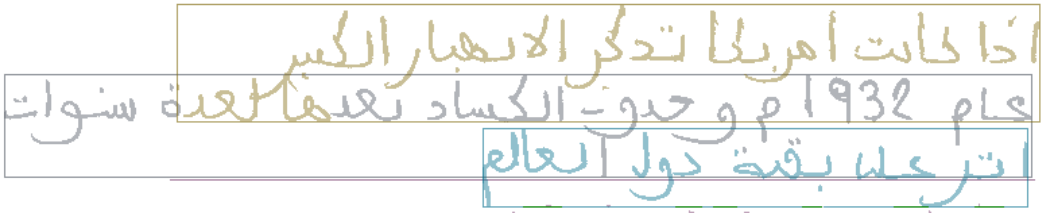




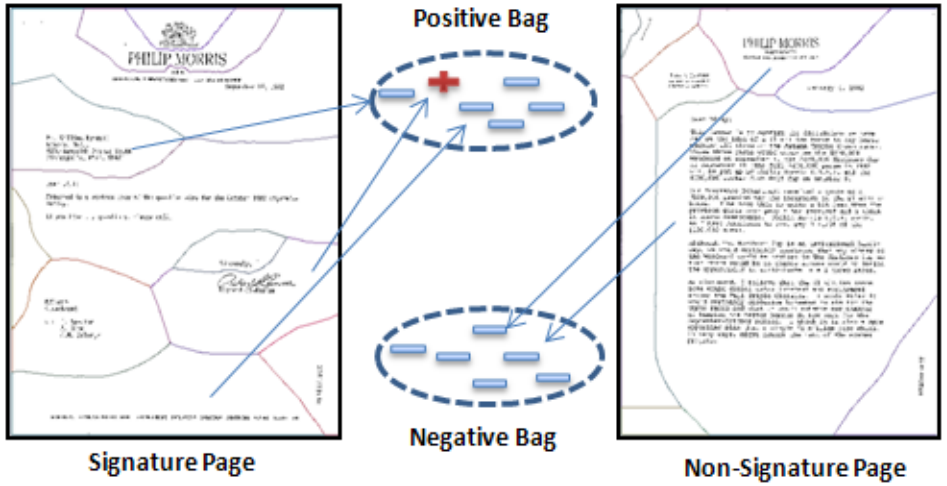
Subspace-based sampling

Research Highlights(contd.)

2 Touching Handwritten Text-Line Segmentation



3 Document Image Labeling Using Multiple Instance Learning



Conclusions

- Pixel-level enhancement using integral images and large-scale learning techniques possible
- LaSVM – Almost linear learning time
- Graph-based method for touching handwritten textline segmentation for Arabic and Latin scripts
- Multiple instance Learning for document labeling, when only document-level annotation available

Mathematical Formula Recognition and Retrieval in PDF Documents

Xiaoyan Lin
Peking University
Advisor: Zhi Tang

Background

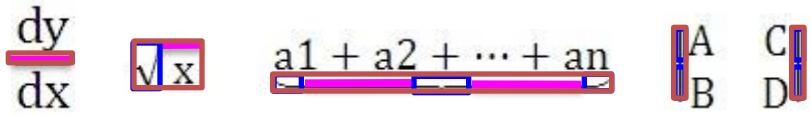
- PDF documents
  - Widely used
- Mathematical formulas in PDF documents
  - Unstructured symbols *[Baker, 2009]*

- Mathematical formulas are difficult to:
  - Extract *[Garain,2009]*
  - Manipulate
  - Retrieve *[Miner,2007] [Zanibbi,2011] [LaTeXSearch]*

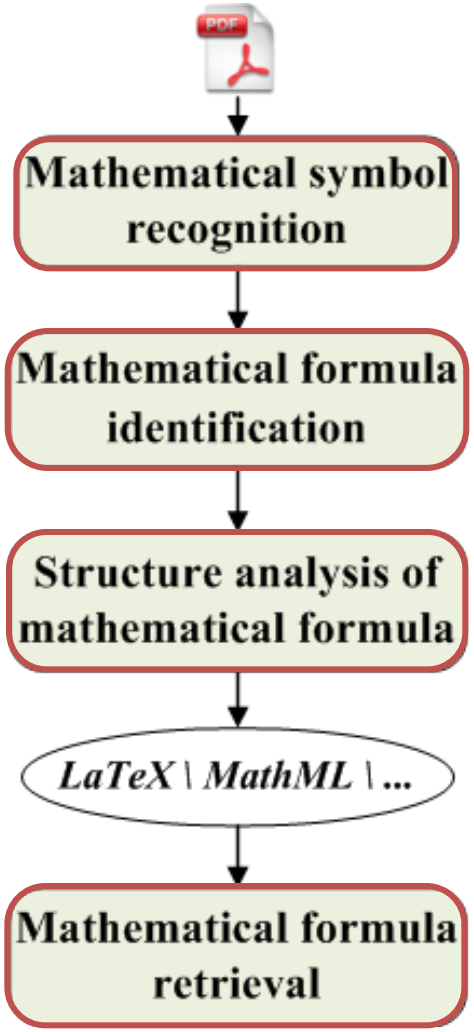
[Baker,2009] J. Baker et al., A Linear Grammar Approach to Mathematical Formula Recognition from PDF, MKM 2009.
[Garain,2009] U. Garain, Identification of mathematical expressions in document images, ICDAR 2009.
[Miner,2007] R. Miner et al, An approach to mathematical search through query formulation and data normalization, MKM 2007.
[Zanibbi,2011] R. Zanibbi et al., Keyword and Image-Based Retrieval for Mathematical Expressions, DRR 2011.
[LaTeXSearch] http://www.latexsearch.com

Proposed Research

- **Math symbol recognition**



- **Formulas identification**
  - Using SVM classification techniques
- **Structure analysis**
  - Fully utilize the accurate character information in PDF files
- **Mathematical formula retrieval**
- **Evaluation**
  - Build a ground-truth PDF documents dataset



Efficient indexing and retrieval of graphs using techniques for embedding graphs in real-valued feature spaces

Muhammad Muzzamil LUQMAN
François Rabelais University of Tours, France[1]
Autonoma University of Barcelona, Spain[2]

Advisor: Professor Jean-Yves RAMEL[1]
Professor Josep Llados[2]

Problematic

- Lack of efficient computational tools for graph based structural pattern recognition approaches

  1) Explicit graph embedding

$$\phi : G \longrightarrow \mathbb{R}^n$$
$$AG \longmapsto \phi(AG) = (f_1, f_2, ..., f_n)$$

  2) Indexing and retrieval of graphs

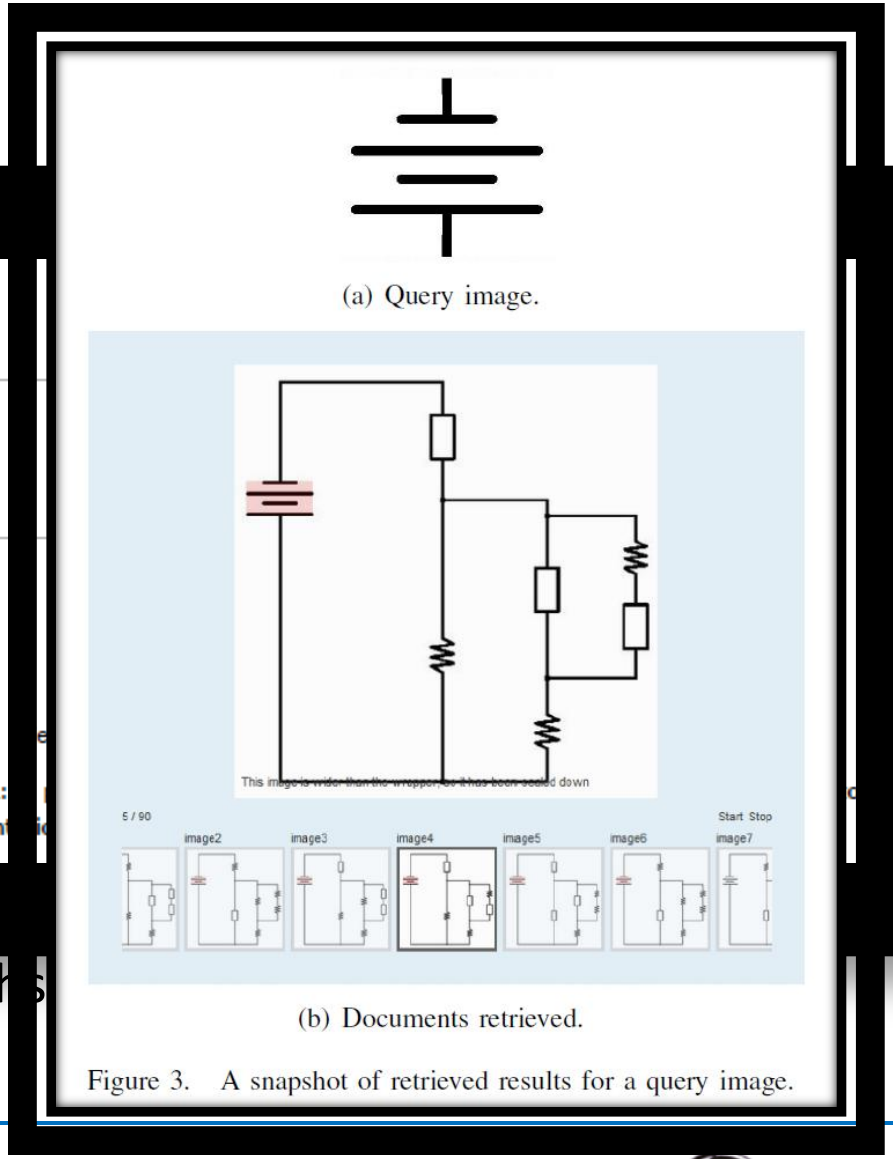
- Primary application domain of thesis is ‘graphic document images’ of architectural drawings and electronic diagrams

Overview of work

1) Expli
-
-
-
-

2) Index
-
-

subgraph



f graph
graphs

ling
xing of graph
f) two-node

Conclusions

- Representational power of structural pattern recognition together with the computational efficiency of statistical pattern recognition

- Numeric feature vector representation of graphs can employ the range of state-of-the-art machine learning method and tools

Geometric-based Symbol Spotting, with Application to Symbol Retrieval in Document Image Databases

Nibal Nayef

University of Kaiserslautern – Germany
Advisor: Prof. Thomas Breuel

TC10 Technical Committee on Graphics Recognition

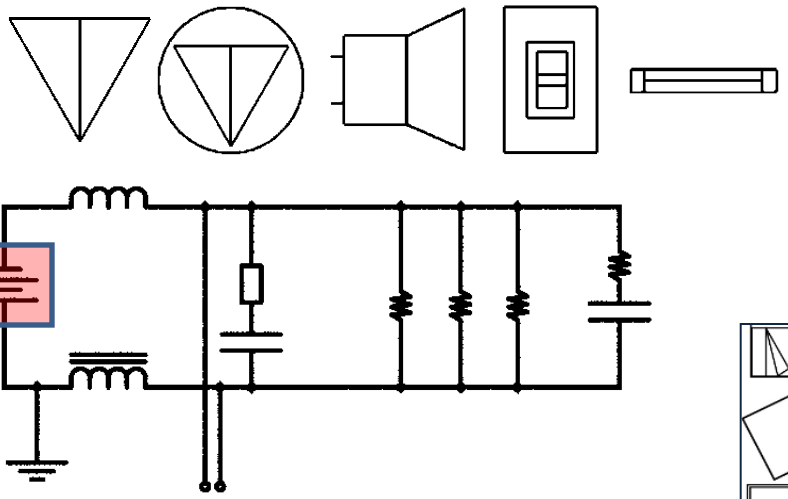
2011 ICDAR Doctoral Consortium

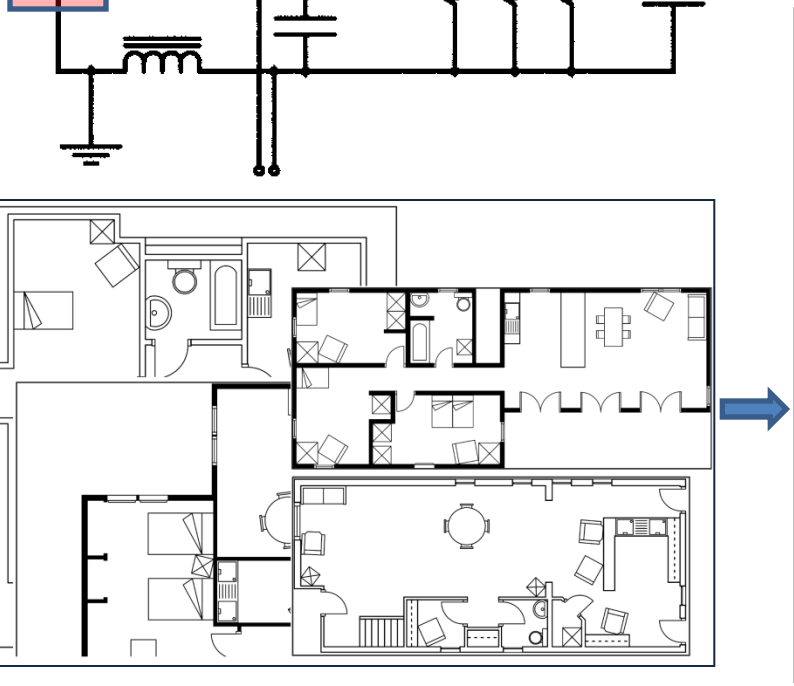
My Ph.D. Work – Overview

- Reliable and efficient symbol retrieval form large document image databases
    - technical line drawings

My Ph.D. Work – Overview

- Symbol recognition
- Symbol spotting
- Symbol retrieval by content analysis



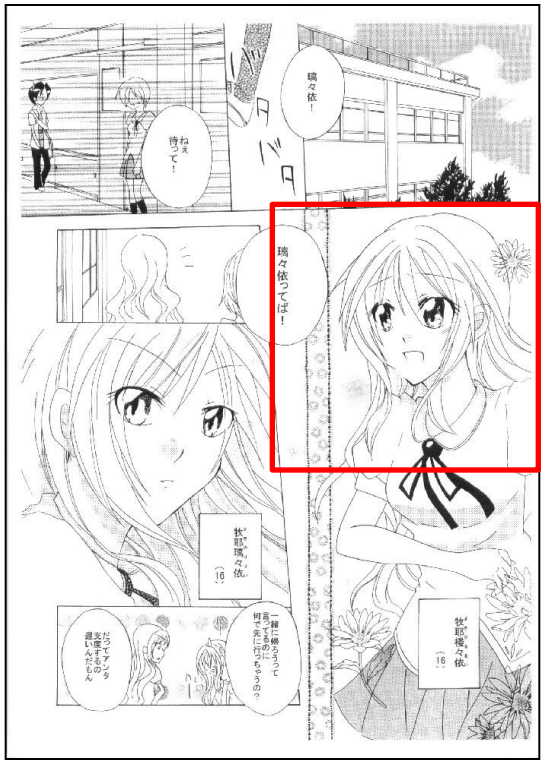


See you at my poster stand !

Copyright Protection of Manga Using Content-based Image Retrieval Methods

Weihan Sun
Osaka Prefecture University
Advisor: Koichi Kise

Copies of manga pages



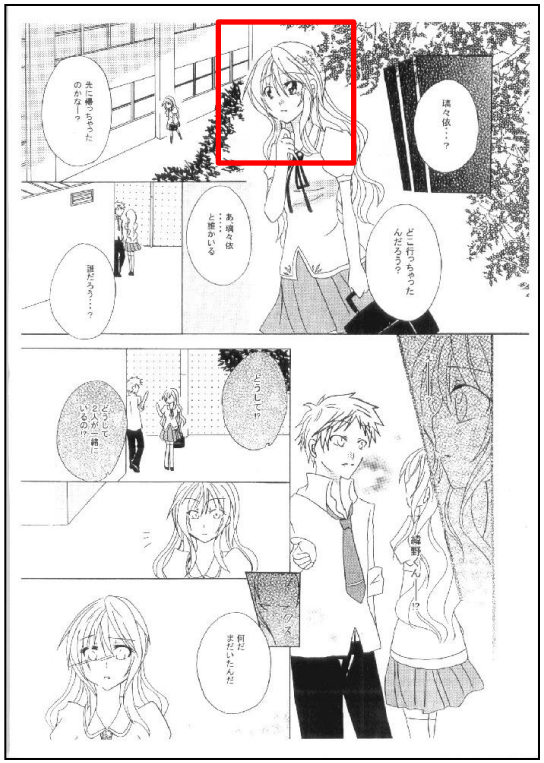
Manga page

printed

hand-drawn

similar

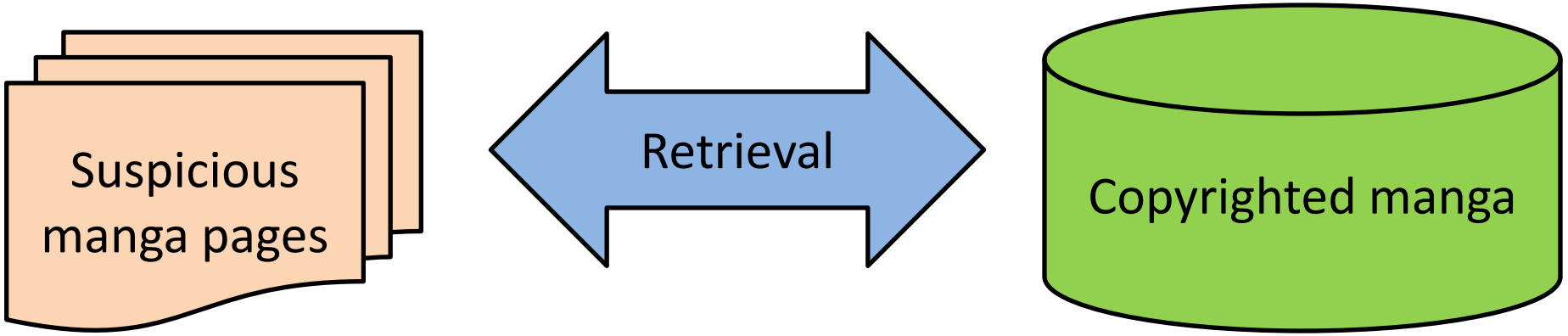
similar



Illegal copy

Partial copies

Content-based image retrieval

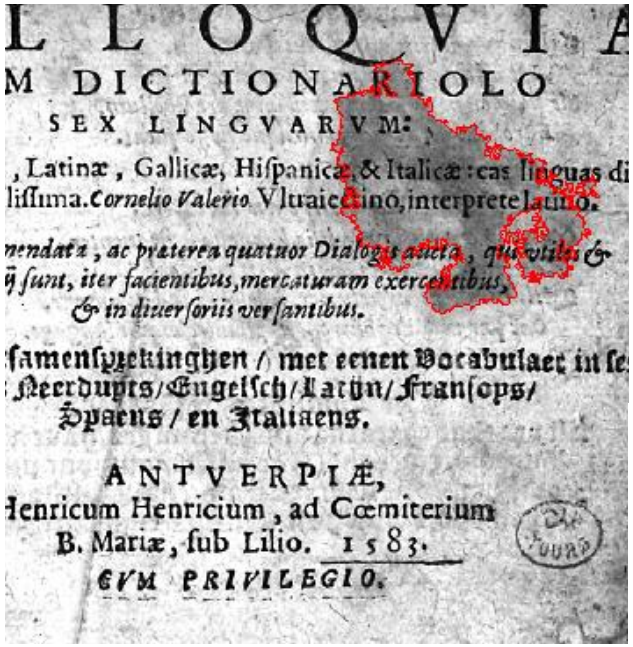


printed | hand-drawn | similar | similar

Partial copies

Quality evaluation of ancient document images

Rabeux Vincent
University of Bordeaux (France)
Advisors: Jean Philippe Domenger, Nicholas Journet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SEX LINGVARVM:
, Latinæ, Gallicæ, Hiſpanicæ, & Italicæ: eas linguas di
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Neerdupts/Engelſch/Latijn/Franſops/
Spaens / en Italiaens.
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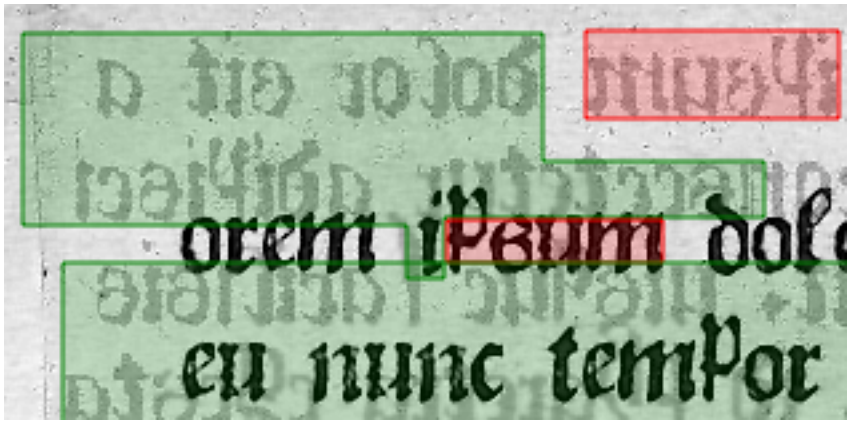
B. Mariæ, ſub Lilio. 1583.
CVM PRIVILEGIO.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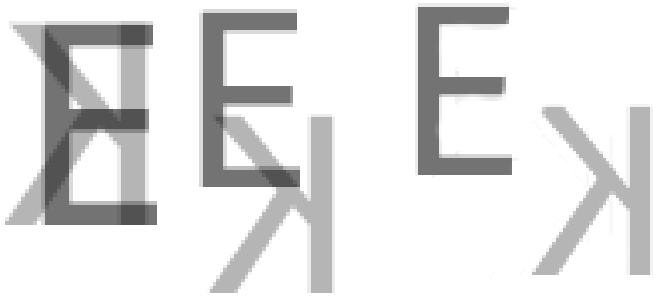
eu nunc tempor


ſe trouve tant de ch
dans Vitruve
ppartiennent pas
à l'Architecture, qu
ce Livre ſoit moi
nſtruire ceux qui
pprendre les prece

Progress up to date

- Focused on bleed through
- Measures characterizing the bleed through. (DRR 2011)



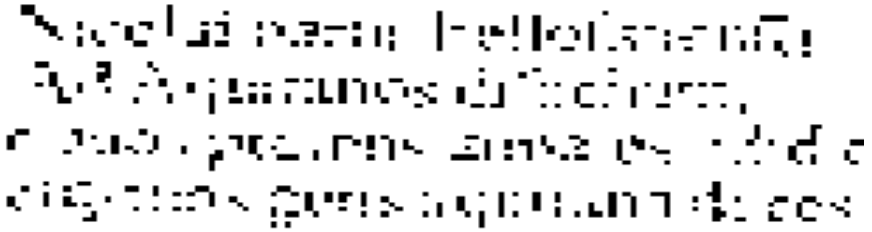
- Correlation with OCRs

ABBYY OCROPUS

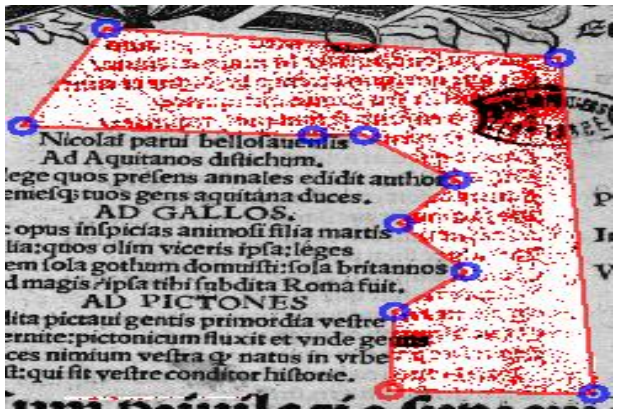
- Registration of a Recto – Verso pair of images (ICDAR2011).

Issues and perspectives

- So many degradations to evaluate the global quality of a page.
- Binarization



- Real documents with a ground-truth concerning degradations.



Research on Part-Based Method of Character Recognition

Song, Wang
Kyushu University, Japan
Advisor: Prof. Seiichi Uchida

Introduction

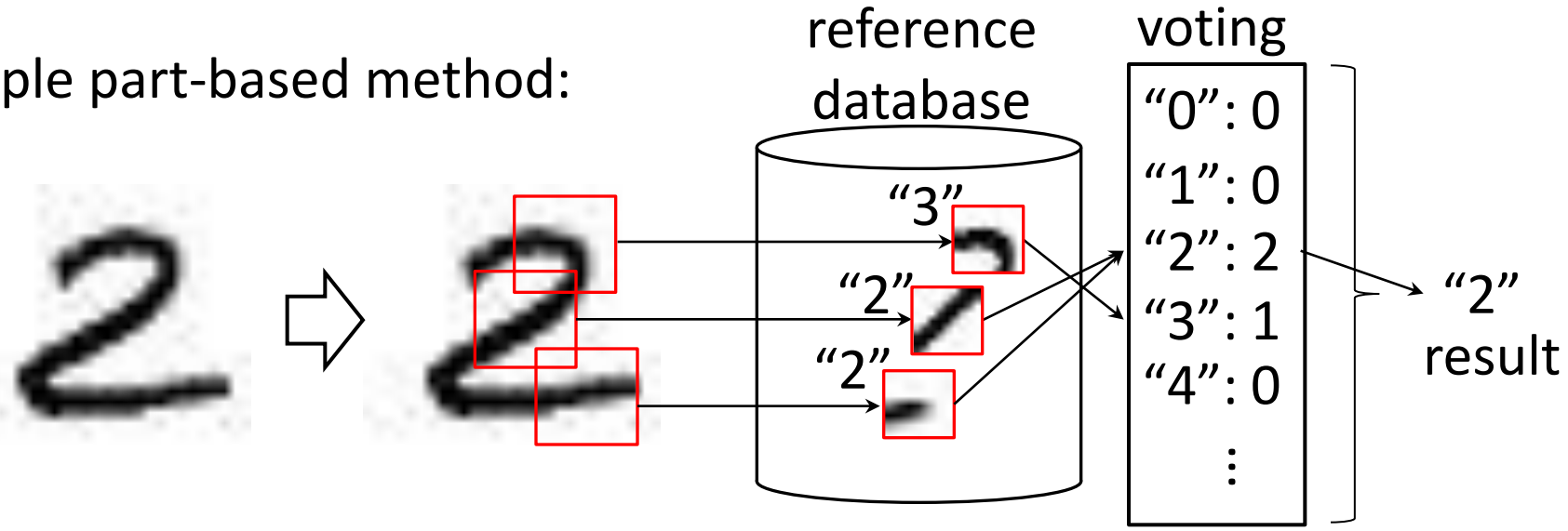
Purpose:

- Recognize characters with global distortion

Approach:

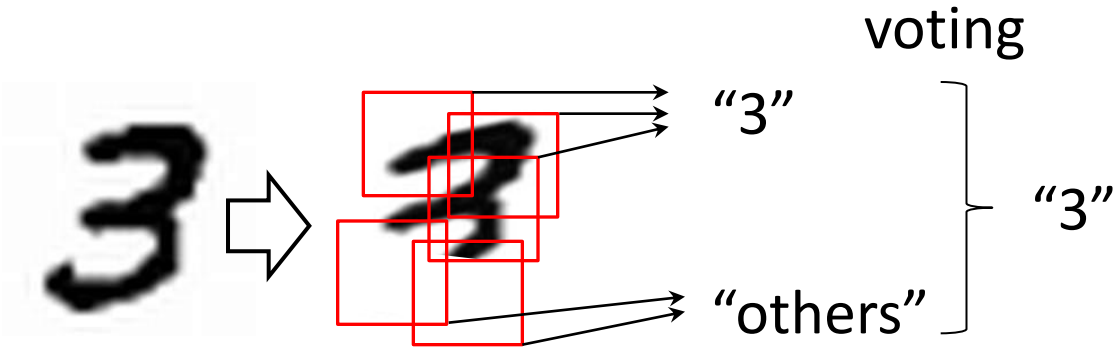
- Using only parts to reduce distortion effects
- Combine results for various parts using voting

A simple part-based method:

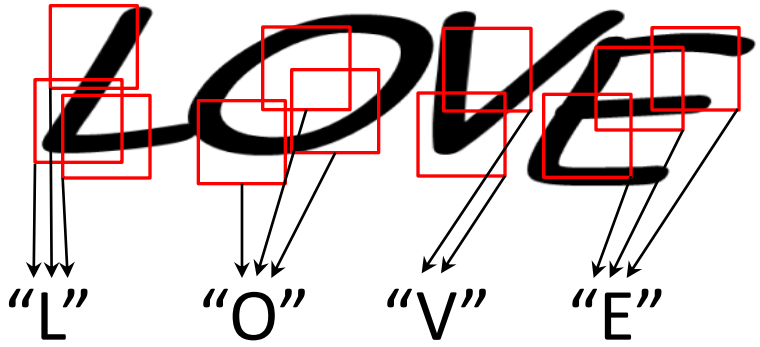


Merits of Part-Based Method

- Robustness



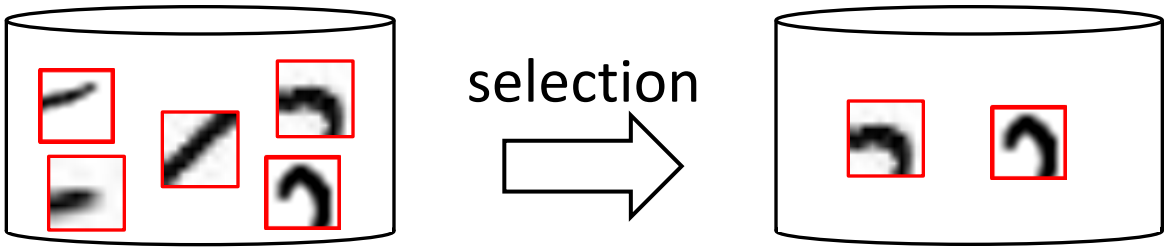
- Preprocessing-free
- Segmentation-free



Progress & Future Work

Problems to deal with:

- Slow running speed



- Demand for higher recognition rate
- Decrease of recognition rate on larger alphabets

	Simple Part-Based	Multiple Voting	Class Distance
Recognition Rate(MNIST)	93.57%	94.92%	97.91%

Segmentation and Recognition of **Touching Characters** in **Offline Chinese Handwriting**

Liang Xu (PhD Student, 3rd year)
Institute of Automation, Chinese Academy of Sciences

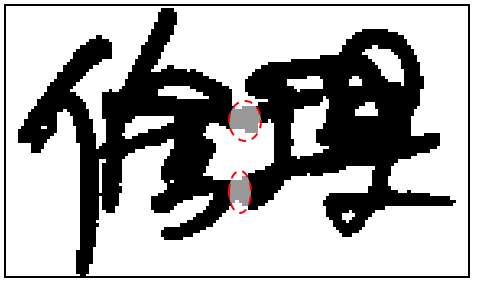
Advisor: *Dr. Cheng-Lin Liu*

Problem with touching characters for Chinese handwriting

- Compound character structure

提 及

- Variability of touching point
  - ***Single***-touching pattern
  - ***Double***-touching pattern

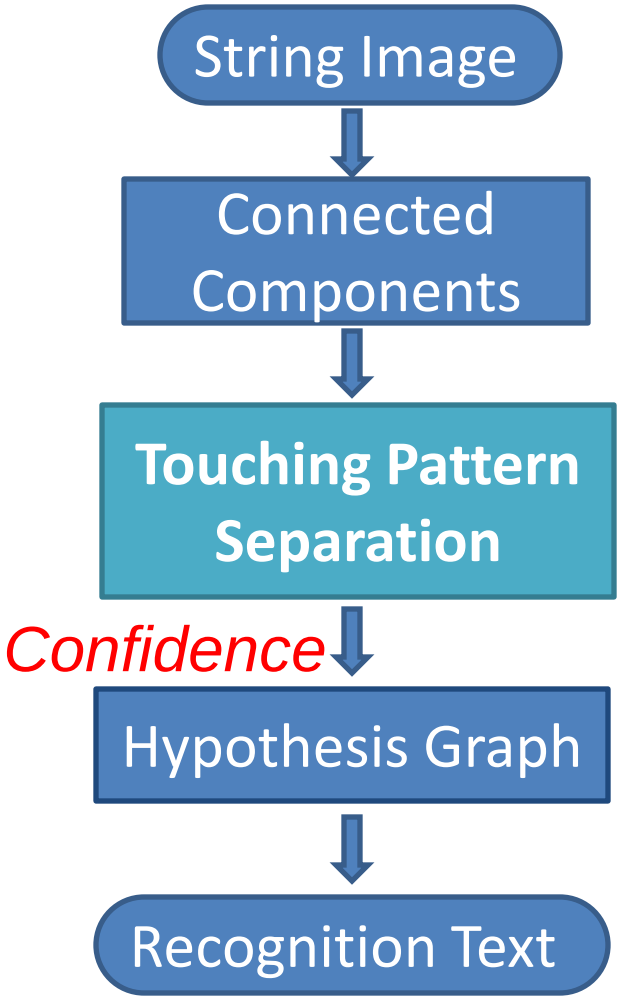


修 理

- ***Segmentation and recognition*** is challenging

Research Plan

- Over-segmentation strategy
- Touching pattern separation
  - *Foreground + Background*
  - *Visibility concept*
- Learning-based separation points filtering
  - *Structure features*



Conclusions

- Over-segmentation strategy for recognition of touching Chinese characters
  - Improve correct separation of touching pattern
  - To solve variability of touching points
    - Visibility concept
    - Learning-based separation points filtering

Schedule

1:40 pm	Welcome
1:45 pm	“Advice for a Successful Ph.D. Experience”
2:10 pm	Brief oral introductions to student research plans
3:10 pm	Coffee break
3:25 pm	Student poster session with discussion and feedback
5:25 pm	Concluding remarks and Best Poster Presentation Award presentation