Digitizing and Linking Civil Registry Records: Experiences with Transkribus and Death Records of Curaçao

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HDSC project, Radboud University Nijmegen

HDSC stands for Historical Database Suriname and Caribbean

That project aims at collecting and make available data on inhabitants of Suriname and the Caribbean, from the nineteenth century onwards

The populations at time consisted of enslaved people, free people, indigenous people and immigrants, recorded in different registers

Target groups for data: researchers and genealogists

https://www.ru.nl/hdsc

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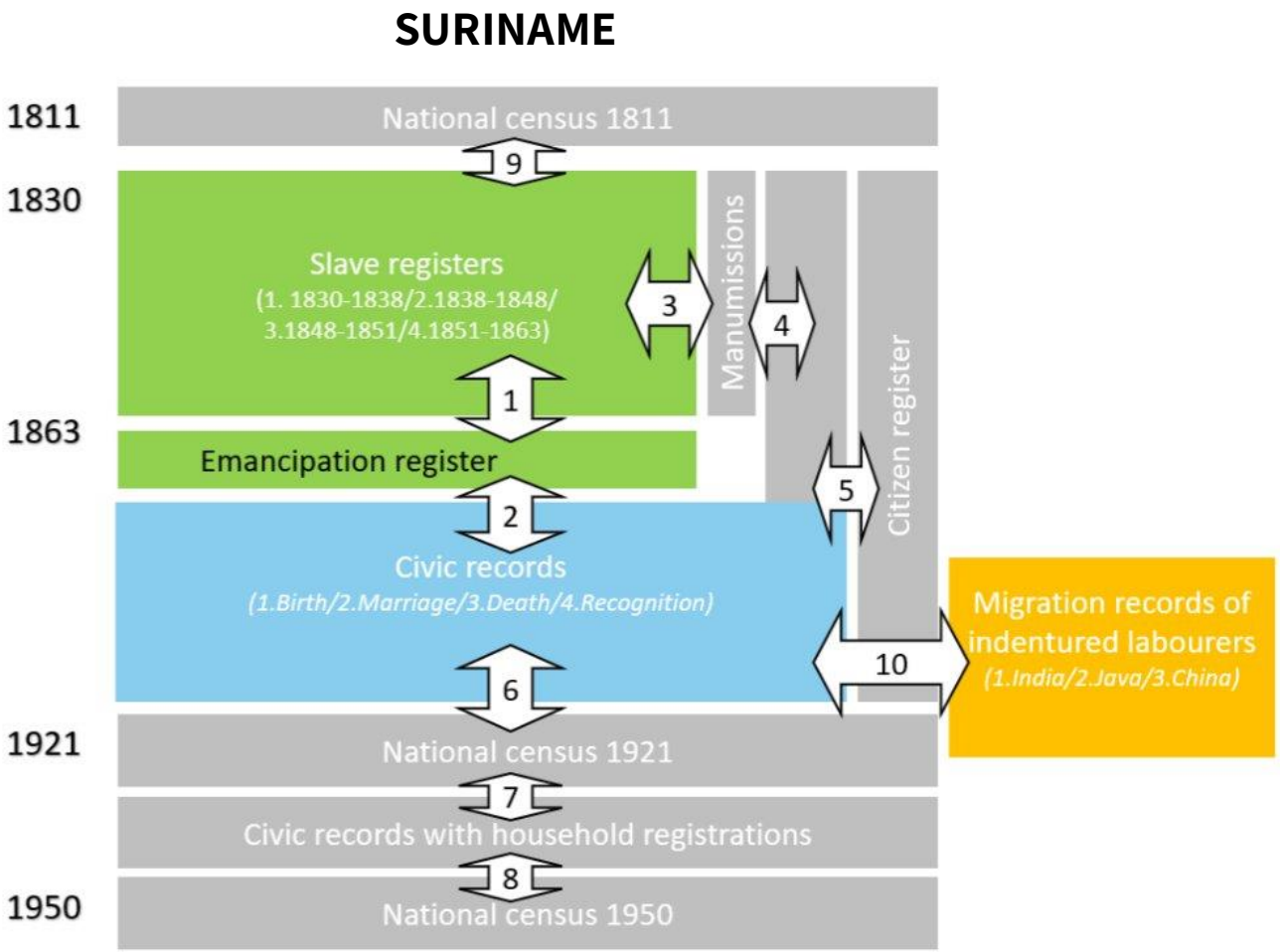
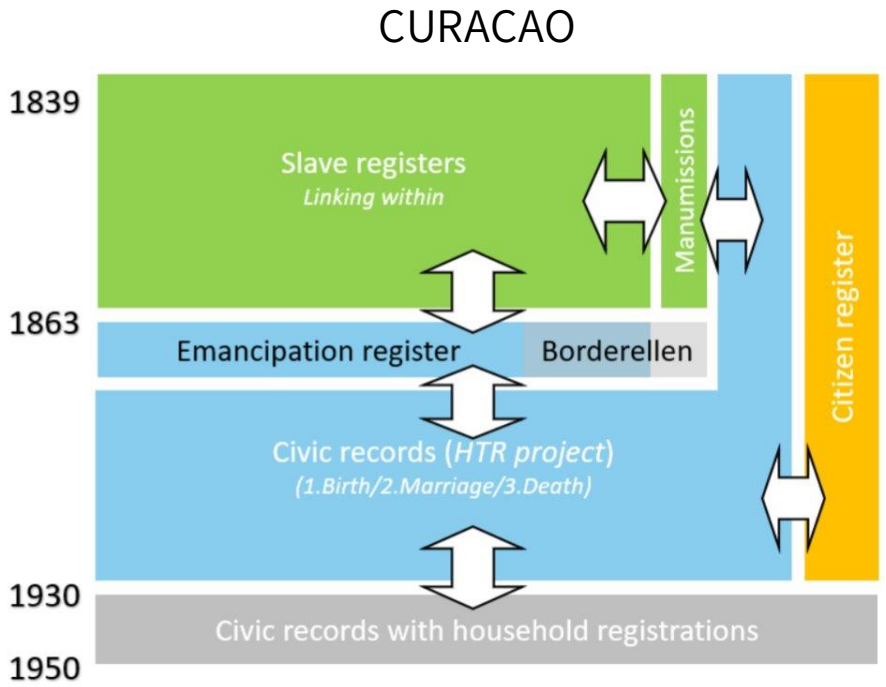
Overview of civic registers





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Current practice

Data from scans of civil registry documents are manually entered in forms by hundreds of volunteers

https://hetvolk.org

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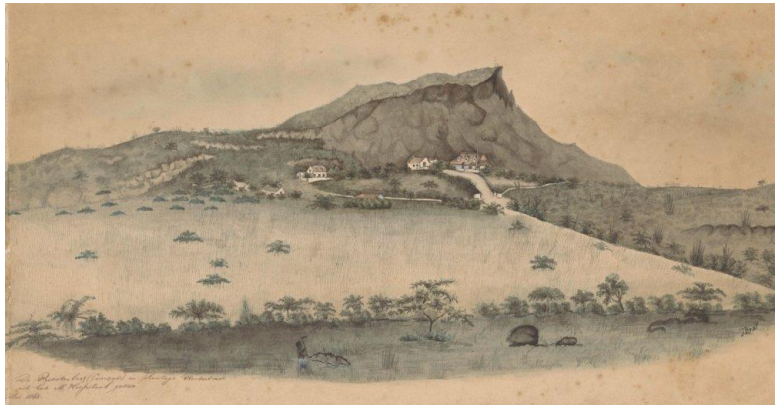
REE-HDSC sub-project



How can hand-written text recognition (HTR) technology and automatic named entity recognition be integrated in the digitization workflow?

Partners

- Data Science group, Radboud University Nijmegen (Lisa Hoek)
- Netherlands eScience Center (Erik Tjong Kim Sang)

https://research-software-directory.org/projects/ree-hdsc

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Transkribus

Popular trainable tool for optical character recognition (OCR) and hand-written text recognition (HTR): from images to text

Processing is performed in three steps:

1. Layout analysis of page
2. Baseline detection: find position of lines of text
3. Optical character recognition and hand-written text recognition

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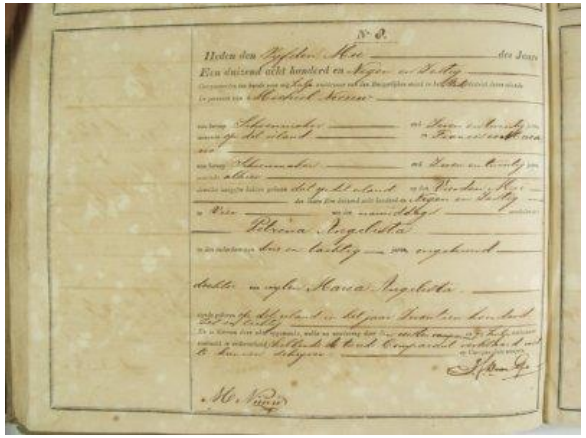
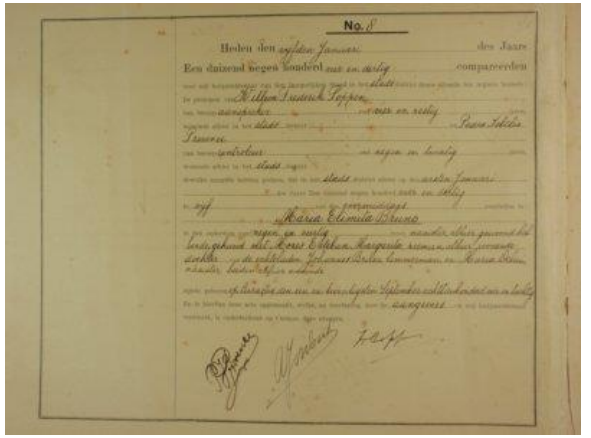
Layout analysis

We found three text formats among the death certificates of Curaçao:

1. Three-column layout (1831-1869)
2. Early two-column format (1869-1933)
3. Late two-column format (1934-1950)

Two layout analysis modules were trained for this corpus (three-column and two-column)





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Transkribus evaluation

After training on our data, Transkribus achieves a character error rate of about 3% (Hoek, 2023)

However, a disproportional number of errors occurs in the most important parts of the text: the person names

These errors are difficult to recover with post-processing

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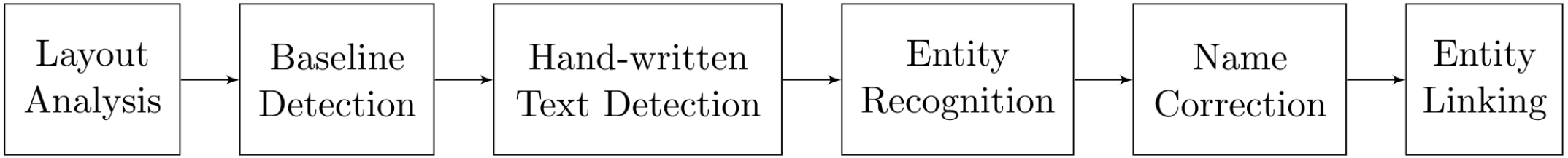
Proposed automated pipeline



1. Layout analysis: determine page layout: how many text columns?
2. Baseline detection: find the lines of text
3. Hand-written Text Detection: get the text of the document
4. Entity Recognition: find the names and dates in the text
5. Name correction: make original deceased name complete
6. Entity Linking: link names of identical persons

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Entity recognition

We considered four approaches for entity recognition:

1. Regular expressions only,
2. Arbitrary entity recognition (with a Dutch Huggingface model) plus rules, implemented for deceased name and death date,
3. Specific entity recognition (for example deceased name): requires model fine-tuning, not realized yet
4. ChatGPT: give ChatGPT a text and ask it to extract information from it

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Evaluation of entity recognition

	Deceased Names			Death Dates		
Method	**Found**	**Exact**	**Partial**	**Found**	**Exact**	**Corrected**
REG only	83%	14%	-	74%	73%	-
ML + REG	95%	17%	55%	76%	37%	58%
GPT3.5	100%	33%	83%	100%	82%	90%
GPT4	100%	34%	81%	100%	84%	91%

Partially correct names: with a Levenshtein distance of up to 3
Corrected dates: taking into account the year in file name

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Entity linking

All names of a person appearing in different documents need to be linked to each other

We have linked people with the same name and birth date

Challenges in our data:

1. People regularly change name
2. Birth dates are not always available (registrants/witnesses)
3. Care should be taken when dealing with data from twins

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Future work

Improve the quality of the HTR

- Create more training material for Transkribus
- Expand the language model with names, but how?

Entity recognition

- Can the quality of machine learning output be improved?
- Do we want to rely on a tool like ChatGPT?

Entity linking

- When should we make a link and when not?

THE END

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