The ABC of Computational Text Analysis

#7 Working with (your own) Data

Faculty of Humanities and Social Sciences
University of Lucerne

15 April 2021

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Updated Schedule

Date	Topic
25 February 2021	Introduction + Where is the digital revolution?
04 March 2021	Text as Data
11 March 2021	Setting up your Development Environment
18 March 2021	Introduction to the Command-line
25 March 2021	Basic NLP with Command-line
01 April 2021	Learning Regular Expressions
08 April 2021	*no lecture (Osterpause)*
15 April 2021	**Working with (your own) Data** ~~Advanced RegEx + Data Sources~~
22 April 2021	**Ethics and the Evolution of NLP** ~~Creating new Data Sets + Ethics~~
29 April 2021	Introduction to Python
06 May 2021	NLP with Python
13 May 2021	*no lecture (Christi Himmelfahrt)*
20 May 2021	NLP with Python + Working Session
27 May 2021	Mini-Project Presentations + Discussion
03 June 2021	*no lecture (Fronleichnam)*

Recap last Lecture

- extract + replace textual parts with RegEx
  - *literal:* `abc`
  - *meta:* `\w \s [^abc] *`

Outline

- you are on spot! 🖐 *#assignment2*
- learn about available data resources
- use your own textual data

  any text ✔

  “any” format

  from anywhere ✔

Assignment #2

Feedback Assignment #2

example solution

- make patterns more general

  date: `DD* Month DDDD`

- keep it simple

  name of month ~ any word ~ `\w+`

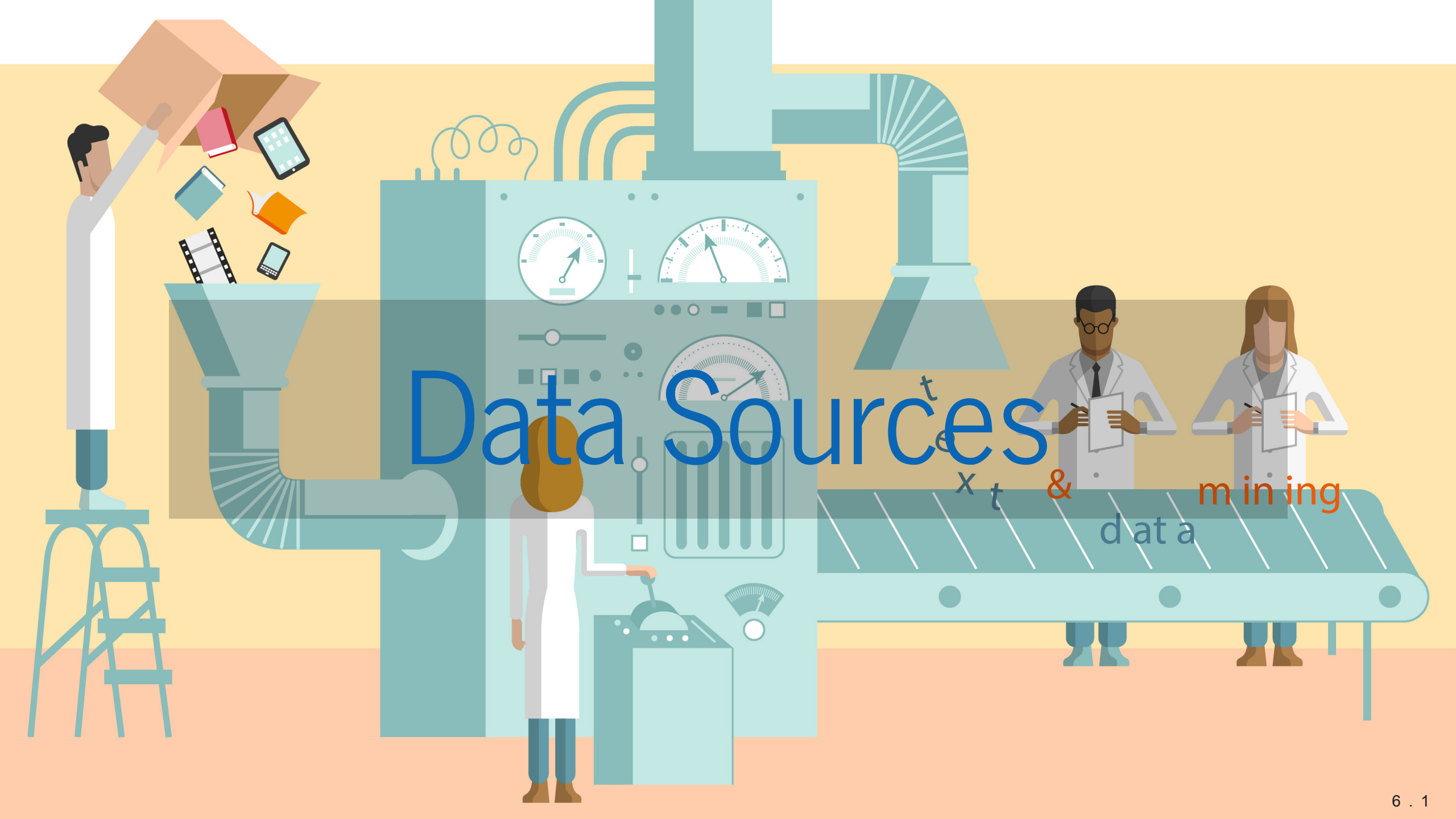
- avoid false positives with positional information

  start of line: `^`

- names are hard to extract

  variation + inconsistency

🤓 check the count of matches with `wc` + the cleanup with `diff`


Data Sources
text & mining
data

What Data Sources are there?

- broadly social
  - *newspapers + magazines*
  - *websites + social media*
  - *reports by NGOs/GOs*
- scientific
  - *journals*
- economic
  - *business plans/reports*
  - *contracts*
  - *patents*

👉 basically, any textual document…

Interesting Publishers

- Nexis Uni
  newspaper, business + legal reports (international)
  licensed by the university
- HathiTrust
  massive collection of books (international)
  open, requires agreement
- Project Gutenberg
  huge collection of books (international)
  open-access
- Constellate by JSTOR and Portico
  scientific articles across disciplines
  provides an easy dataset builder

Dataset Search

- Harvard Dataverse

  open scientific data repository

- Google Dataset Search

  Google for datasets basically

- corpora by the Department of Computational Linguistics @ UZH

👉 search for a topic followed by `corpus` or `text collection`

Search Techniques

Make your web search more efficient by using dedicated tags. Examples:

- `"computational social science"`
- `nature OR environment`

Some great historical Corpora

ready off the shelf, machine-readable

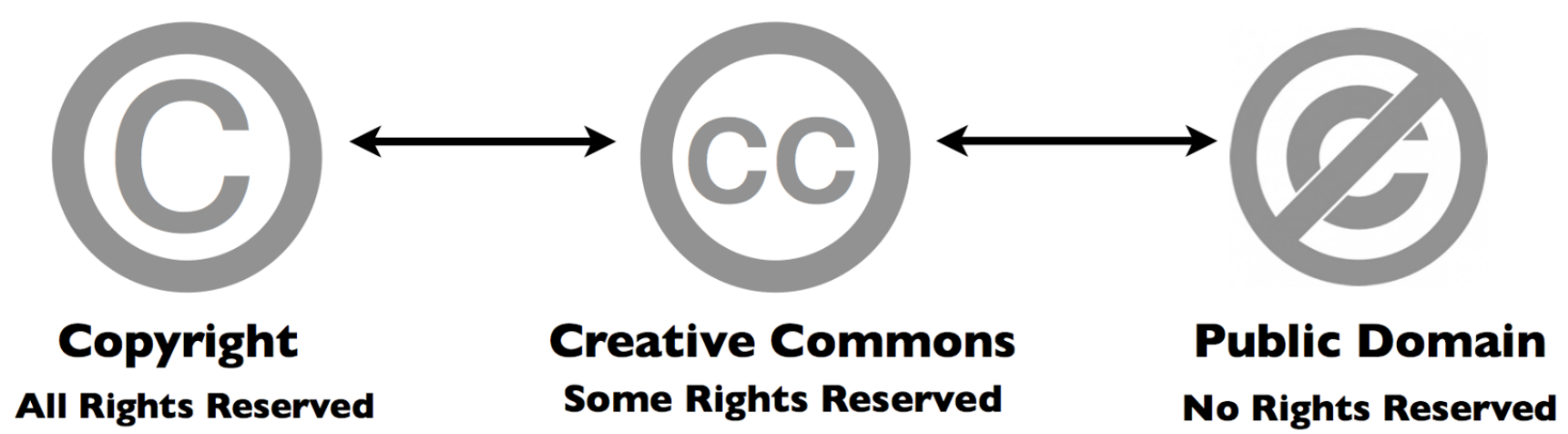
- 1 August speeches by Swiss Federal Councillors
  provided via course repo
- Human Rights Texts
- United Nations General Debate Corpus

Online Computational Text Analysis

- Impresso
  many historical newspapers + magazines (CH, LU)
  free, requires account
- bookworm HathiTrust
  great filtering by metadata
  credible scientific source
- Google Ngram Viewer
  no filtering option
  useful for quick analysis

Copyright 🚫

- may further limit access to high quality data
- check the rights before processing the data



Copyrighs may restrict some data use (src)

Preparing your own Data

A world for humans …
… and a jungle of file formats.

Common Conversions

news, press releases, reports from organizations

⬇️

digital native documents

`.pdf`, `.docx`, `.html`

convert to `.txt`

scans of (old) documents

`.pdf`, `.jpg`, `.png`

Optical Character Recognition (OCR)

machine-readable ✅

Conversion of DOCX

use case: news articles from Nexis

- `pandoc` to convert many file formats
- download as single articles in `.docx` on Nexis

```
# convert docx to txt
pandoc infile.docx -o outfile.txt

### Install first with
brew install pandoc      # macOS
sudo apt install pandoc # Ubuntu
```

Conversion of native PDF

use case: Swiss party programmes

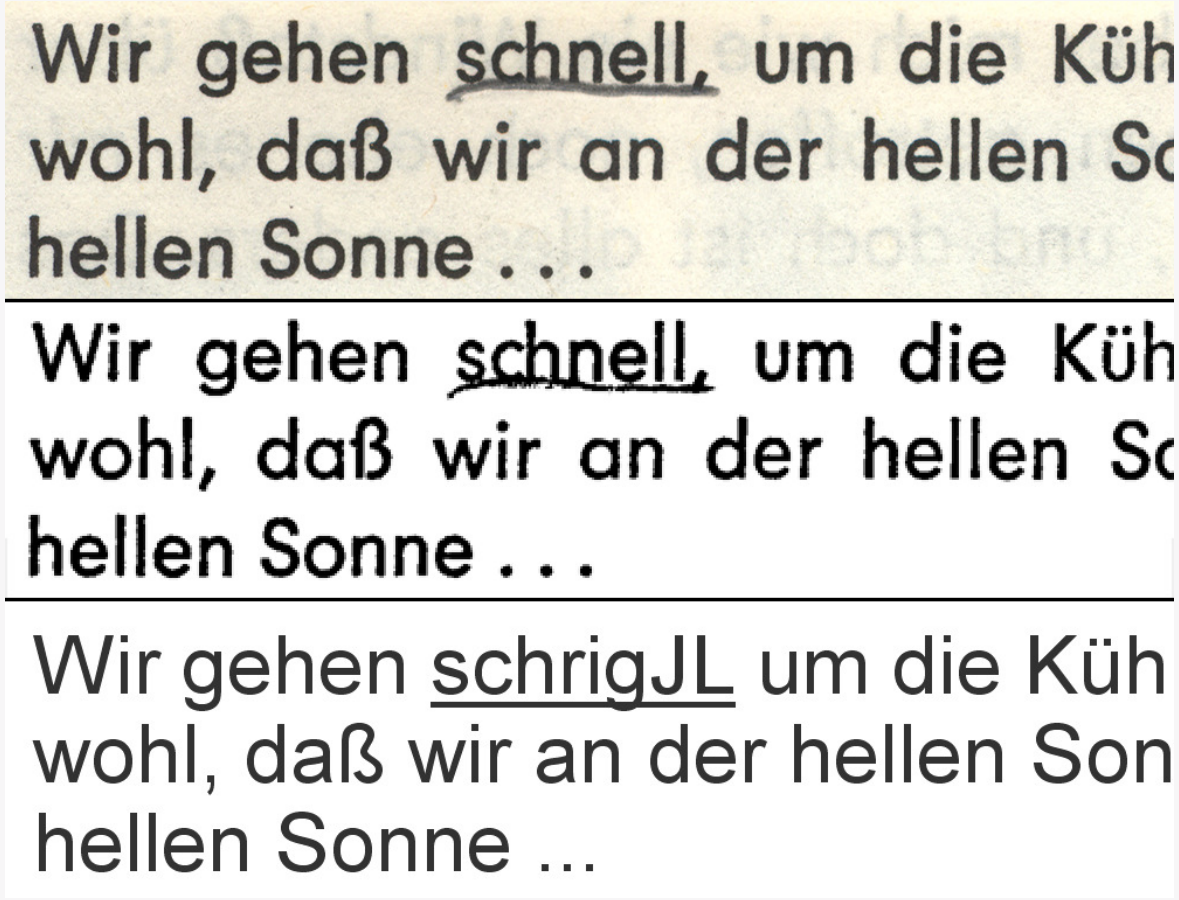
- `pdftotext` extracts text from non-scanned PDF

```
# convert native pdf to txt
pdftotext -nopgbrk -eol unix infile.pdf

### Install first with
brew install poppler            # macOS
sudo apt install poppler-utils  # Ubuntu
```

Optical Character Recognition (OCR)

- OCR ~ convert images into text
  extract text from scans/images
- `tesseract` performs OCR
  language-specific models
  supports handwriting + Fraktur texts
- image quality is crucial



steps when performing OCR (Wikipedia)

Conversion of digitalized PDF

use-case: historical party programmes

1. extract image from PDF + improve contrast
2. run optical character recognition (OCR) on the image

```
# convert scanned pdf to tiff, control quality with parameters
convert -density 300 -depth 8 -strip -background white -alpha off \
infile.pdf temp.tiff

# run OCR for German ("eng" for English, "fra" for French etc.)
tesseract -l deu temp.tiff file_out

### Install first with
brew install imagemagick            # macOS
sudo apt-get install imagemagick    # Ubuntu
```

#LifeHack: Make a PDF searchable

use case: scanned book chapters

```
# output searchable pdf instead of txt
convert -density 300 -depth 8 -strip -background white -alpha off -compress group4 \
file_in.pdf temp.tiff

tesseract -l deu temp.tiff file_out pdf
```

Scraping PDF from Websites

use case: Swiss voting booklet

- `wget` to download any files from the internet

```
# get a single file
wget EXACT_URL

# get all linked pdf from a single webpage
wget --recursive --accept pdf -nH --cut-dirs=5 \
--ignore-case --wait 1 --level 1 --directory-prefix=data \
https://www.bk.admin.ch/bk/de/home/dokumentation/abstimmungsbuechlein.html

# --accept FORMAT_OF_YOUR_INTEREST
# --directory-prefix YOUR_OUTPUT_DIRECTORY
```

Example Sources

- Party Programmes across Europe
- Swiss voting booklets
- 1 August speeches by Swiss Federal Councillors
- Nestlé Annual Reports
- … any organization of your interest 👍

Foundation of Batch Processing

perform the same operation on many files

```
# loop over all txt files
for file in *.txt; do

    # indent all commands in loop with a tab

    # rename each file
    # e.g. a.txt -> new_a.txt
    mv $file new_$file

done
```

Perform Batch OCR from PDF

```
for FILEPATH in *.pdf; do
    # convert pdf to image
    convert -density 300 $FILEPATH -depth 8 -strip \
    -background white -alpha off temp.tiff

    # define output name (remove .pdf from input)
    OUTFILE=${FILEPATH%.pdf}

    # perform OCR on the tiff image
    tesseract -l deu temp.tiff $OUTFILE

    # remove the intermediate tiff image
    rm temp.tiff

done
```

Preprocessing → RegEx


Questions?

In-class: Exercises I

1. Make sure that your local copy of the Github repository KED2021 is up-to-date with `git pull`. Check out the data samples and scripts in `materials/`.
2. Install the missing tools with the commands given on the respective slides: `pandoc, imagemagick, poppler`
3. **Digest the commands. Test them. Check the resources. Ask questions. Think about your mini-project.**
4. Use `wget` to download one or all *cogito* issues (PDF files) from the UniLu website.
5. Convert the *cogito* PDF files into TXT files.
6. `wget` is a powerful tool. Have a look at its arguments and search for more examples in tutorials on the web.

Resources

Make a more sophisticated script for PDF conversion

- Erick Peirson. 2015. Tutorial: Text Extraction and OCR with Tesseract and ImageMagick - Methods in Digital and Computational Humanities - DigInG Confluence. online

References