

# Handwritten Text Recognition (HTR)

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## Overview

- Facsimile Image to Text
  - Optical Character Recognition (OCR): typeset documents
  - Handwritten Text Recognition (HTR): handwriting
- Steps
  - Layout analysis
  - Text recognition (optional)/Manual transcription
  - Model training (we need 50 pages/language)
- Tools
  - Transkribus
  - Pero
- HTR Workflow in this course
  - Select one or more document mini-collections from teachers' lists (they are already loaded in the HTR tools)
  - Perform Layout Analysis (automatically + correct manually)
  - Transcribe (manually/semi-automatically – until the outcome is perfect! Annotate unclear segments with the *Unclear* tag in Transkribus)

## Facsimile to text

- Started in industry/blind care
- OCR-A font since 1968 0123456789
- Individual characters (glyphs)**
- Preprocessing
  - De-skew
  - De-tilt
  - De-speckle
  - Black-white

abc

historia i

historia i

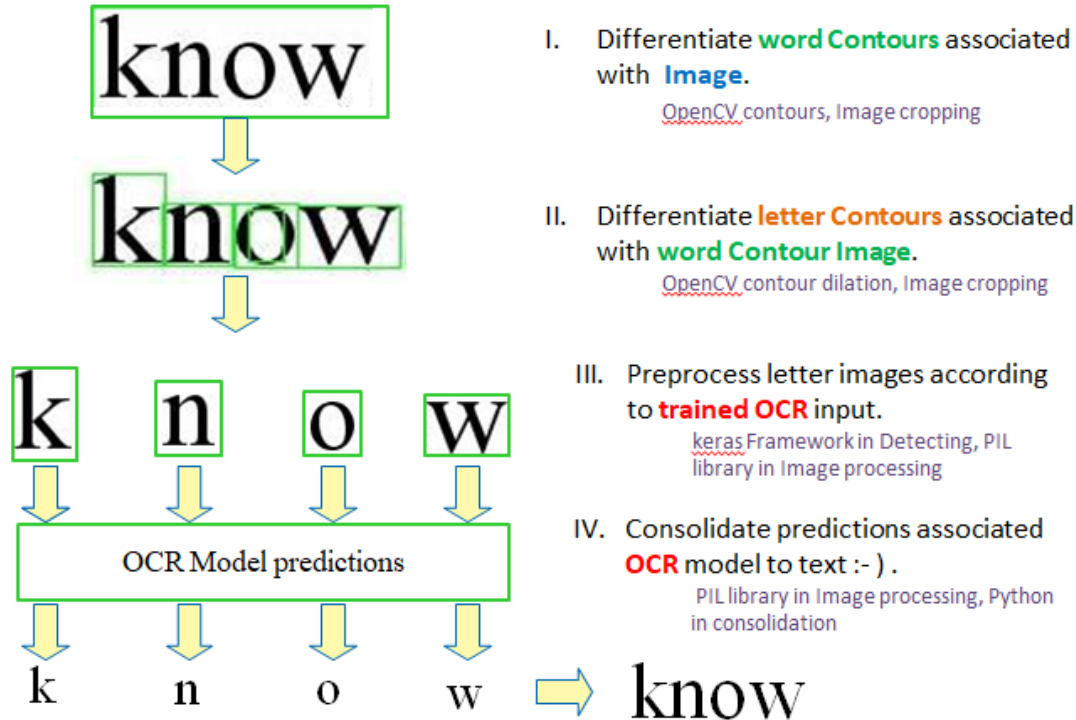
historia i

ligatures !!!

## Handwritten Text / Handwriting Recognition, Intelligent Word Recognition

- Recognizes segments of text, not individual glyphs, also in cursive scripts & handwriting
- Active Learning: User corrects transcription, system learns from human corrections, iteratively
- Easier: online text recognition – transcription in real time, from a video recording, a touch screen, etc.
- Intelligent **Character** Recognition: once words are recognized, it associates parts of the segments to individual characters from the transcript.

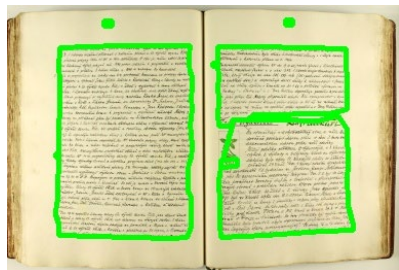
## Optical Character Recognition flow diagram



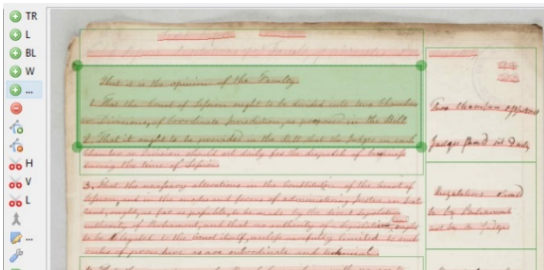
## Layout analysis

- Pero: regions

<https://www.youtube.com/watch?v=-Of2TrjJlwU>



Pero



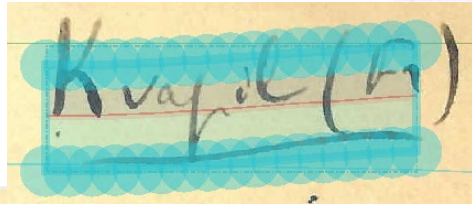
Transkribus

- Transkribus: regions and baselines

<https://www.youtube.com/watch?v=r8woJQSyGE> (at 1:27)

[https://readcoop.eu/transkribus/how-to/how-to-transcribe-documents-with-transkribus-introduction/#elementor-toc\\_heading-anchor-3](https://readcoop.eu/transkribus/how-to/how-to-transcribe-documents-with-transkribus-introduction/#elementor-toc_heading-anchor-3)

## What does the system *really* see? Peek into an XML export file!



```

<TextLine ID="r111"
  BASELINE="1158,148 1184,148 1210,148 1236,147 12
  1340,142 1366,140 1392,138 1418,136 1444,134 147
  1548,127 1575,126"
  HEIGHT="110"
  WIDTH="417"
  VPOS="67"
  HPOS="1158">
  <String HEIGHT="110"
    WIDTH="348"
    VPOS="67"
    HPOS="1123"
    CONTENT="Kvapil"/>
  <SP HEIGHT="110" WIDTH="35" VPOS="67" HPOS="1471"/>
  <String HEIGHT="110"
    WIDTH="243"
    VPOS="67"
    HPOS="1332"
    CONTENT="(Fr.)"/>
</TextLine>

```



## Automatic Recognition come in the upcoming live demo session.

- The demo sessions for Transkribus and Pero take place separately.



## Credits

<a href="https://commons.wikimedia.org/wiki/File:OCR-A_char_digits.svg">https://commons.wikimedia.org/wiki/File:OCR-A_char_digits.svg</a>	John Sauter, Public domain, via Wikimedia Commons
<a href="https://www.researchgate.net/publication/337236656/figure/fig5/AS:824950537584649@1573694943363/Example-of-the-line-segmentation-step-Top-input-image-of-a-very-challenging-text_Q640.jpg">https://www.researchgate.net/publication/337236656/figure/fig5/AS:824950537584649@1573694943363/Example-of-the-line-segmentation-step-Top-input-image-of-a-very-challenging-text_Q640.jpg</a>	Reul, C. et al. (2019). OCR4all—An Open-Source Tool Providing a (Semi-)Automatic OCR Workflow for Historical Printings. Applied Sciences. 9. 4853. 10.3390/app9224853.
<a href="https://medium.datadriveninvestor.com/4-simple-steps-in-building-ocr-1f41c66099c1">https://medium.datadriveninvestor.com/4-simple-steps-in-building-ocr-1f41c66099c1</a>	Naga Kiran
<a href="https://pero-ocr.fit.vutbr.cz/document/public_documents">https://pero-ocr.fit.vutbr.cz/document/public_documents</a>	The PERO OCR project
<a href="https://readcoop.eu/transkribus/howto/how-to-transcribe-documents-with-transkribus-introduction/#elementor-toc__heading-anchor-3">https://readcoop.eu/transkribus/howto/how-to-transcribe-documents-with-transkribus-introduction/#elementor-toc__heading-anchor-3</a>	The Transkribus project
<a href="#">Data Analytics for Students of Social Studies and Humanities</a>	<a href="https://ufal.mff.cuni.cz/courses/npfl134">https://ufal.mff.cuni.cz/courses/npfl134</a>

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