FAIRer transcriptions: HTR-United and the possibility of a common for training data

Alix Chagué

FAIRer transcriptions: HTR-United and the possibility of a common for training data

Alix Chagué - alix.chague@inria.fr
(Inria; UdeM; EPHE)

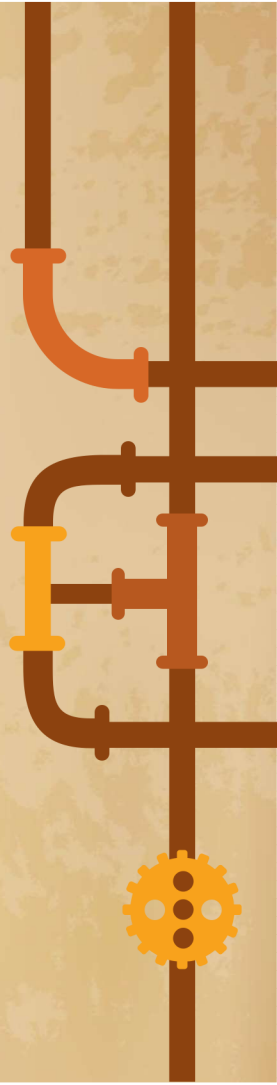
Naples - April 16, 2024

Horizons of digital philology

Foreword

This presentation was partly inspired from Thibault Clérice's introduction to HTR with eScriptorium.

WHAT ARE WE TALKING ABOUT? SOME DEFINITIONS

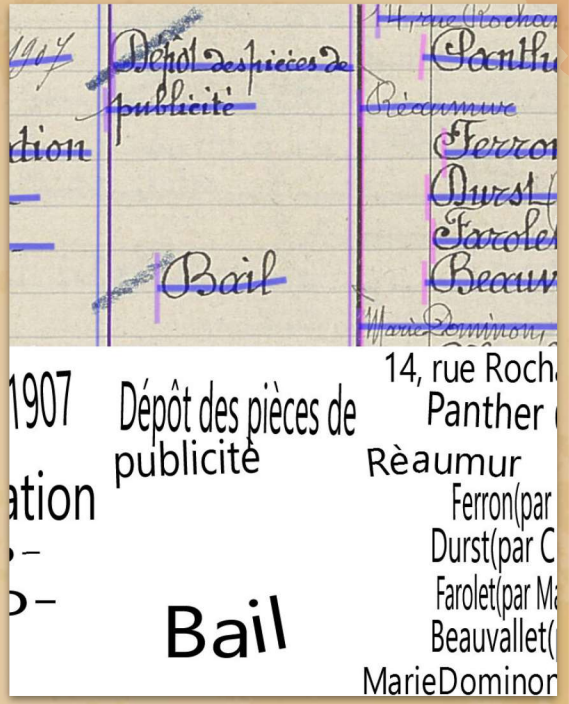


What is text recognition?

- HTR : Handwritten Text Recognition
- OCR : Optical Character Recognition

Key points to understand how it works:

1. Predict a textual content
2. From the image of a document (page)
3. Thanks to IA trained by humans
4. In an iterative process involving
   a. human interventions
   b. automatic/computation steps



Processing manuscript vs. prints

OCR (for prints)

- <2% character error
- Commercial software (FineReader, Google Cloud Vision, etc.) or open source software (Tesseract 4)
- Language-specific generic models ready to be used, rely on fonts

HTR (for manuscripts)

- 5-10% of character error
- Commercial software (Transkribus, ...) or open source software (Kraken / eScriptorium, ...)
- Require creating data to build a corpus-specific model

Processing manuscript vs. prints

OCR (for prints)

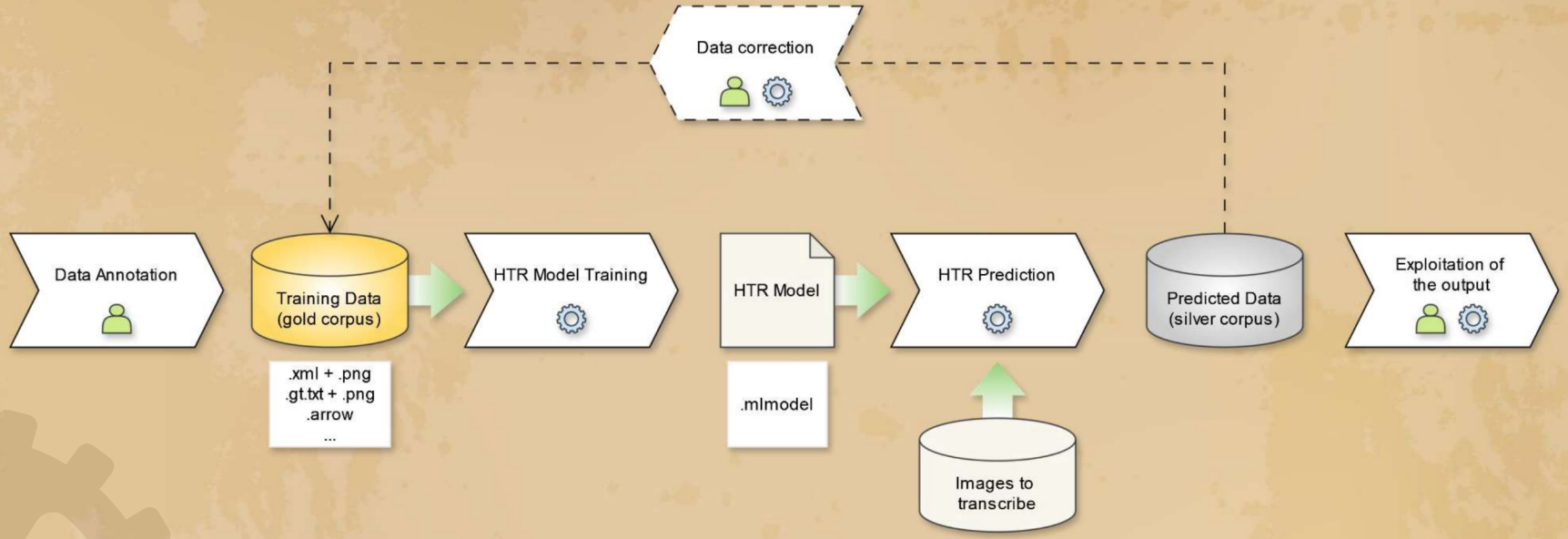
- <2% character error
- Commercial software (FineReader, Google Cloud Vision, etc.) or open source software (Tesseract 4)
- Language-specific generic models ready to be used, rely on fonts

HTR (for manuscripts)

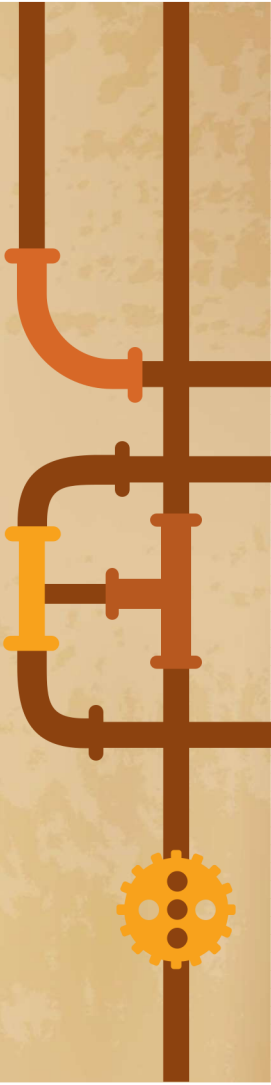
- 5-10% of character error
- Commercial software (Transkribus, ...) or open source software (Kraken / eScriptorium, ...)
- Require creating data to build a corpus-specific model

demands more skills from users of HTR!

Creating data and training a model



MEASURING THE ERROS IN AUTOMATIC TRANSCRIPTION



Measuring the success of a Text Recognition model

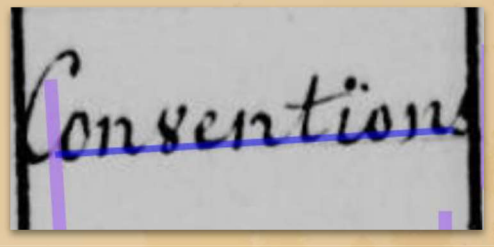
- Metrics are a useful (but imperfect) way to assess the success of HTR
- Understanding how we evaluate an HTR models helps understanding how it operates and what to expect from using HTR
- When assessing the performance of an HTR model:
  - **Character Error Rate**
  - **Word Error Rate**
- Computed by comparing a **reference text** and the model's **prediction** (ideally using the same segmentation)
- A model should not be tested on the data used to train it!

Types of errors

Categories to compute metrics:

- Substitution : STEAM → STEAL
- Deletion : STEAM → TEAM
- Insertion : STEAM → STREAM

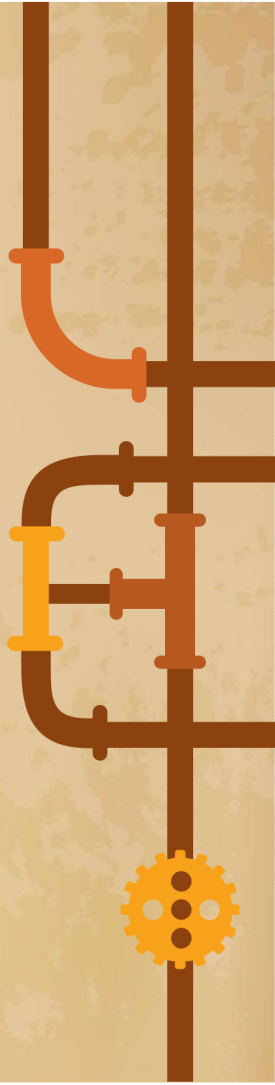
$$CER = \frac{S + D + I}{N}$$



But there's more subtlety to it!

- Non-word errors (STEAN) vs. real-word errors
- Case-errors (StEAM) ; diacritic errors (STÉAM) ;
- Punctuation errors ; whitespace errors ; digits
- Many errors are caused by an imperfect segmentation (missing end of line, etc.)

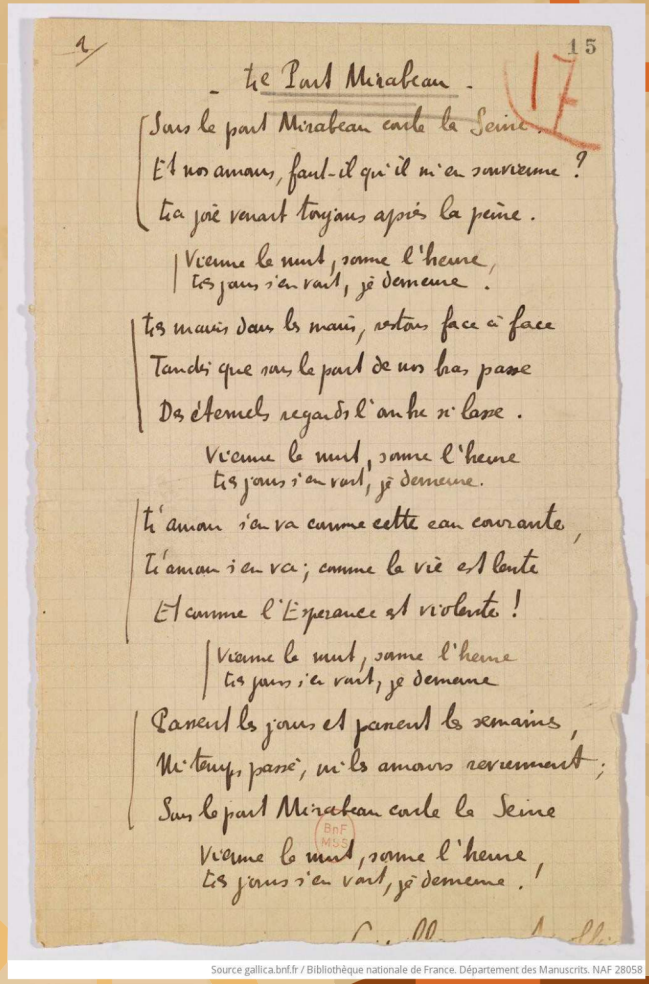
TRANSCRIBING IS NOT SELF EVIDENT



Text Recognition is a Computer Vision task

- Relies on visual clues
- Doesn't *understand* the text, only *sees* it
- Produces what it is trained to produce

What is textual content?



1 15

17

Le Pont Mirabeau.

Sous le pont Mirabeau coule la Seine,
Et nos amours, faut-il qu'il m'en souvienne ?
La joie venait toujours après la peine.

Vienne la nuit, sonne l'heure,
Les jours s'en vont, je demeure.

Les mains dans les mains, restons face à face
Tandis que sous le pont de nos bras passe
Des éternels regards l'onde si lasse.

Vienne la nuit, sonne l'heure
Les jours s'en vont, je demeure.

L'amour s'en va comme cette eau courante,
L'amour s'en va; comme la vie est lente
Et comme l'Espérance est violente !

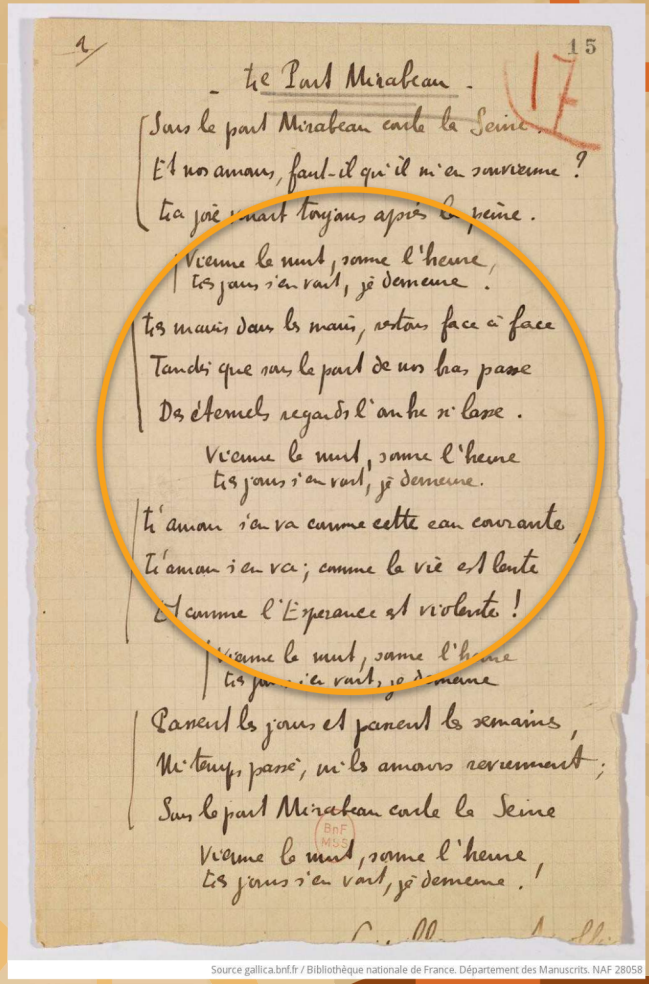
Vienne la nuit, sonne l'heure
Les jours s'en vont, je demeure

Passent les jours et passent les semaines,
Ni temps passé, ni les amours reviennent;
Sous le pont Mirabeau coule la Seine

Vienne la nuit, sonne l'heure,
Les jours s'en vont, je demeure.

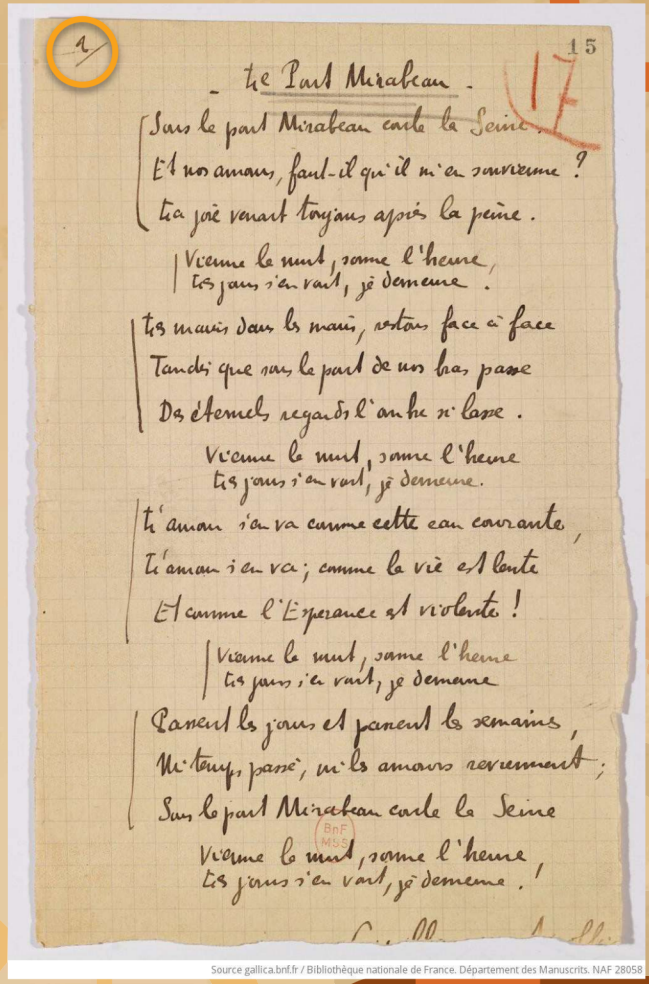
What is textual content?

- the main body of text (different paragraphs, title)



What is textual content?

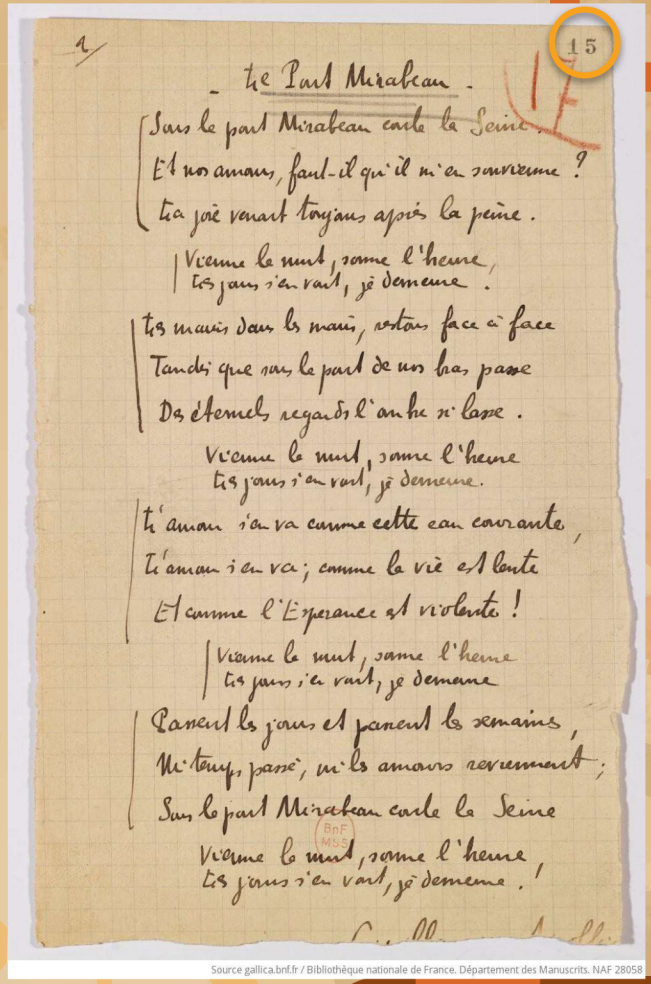
- the main body of text (different paragraphs, title)
- the handwritten page number?



Source gallica.bnf.fr / Bibliothèque nationale de France. Département des Manuscrits. NAF 28058

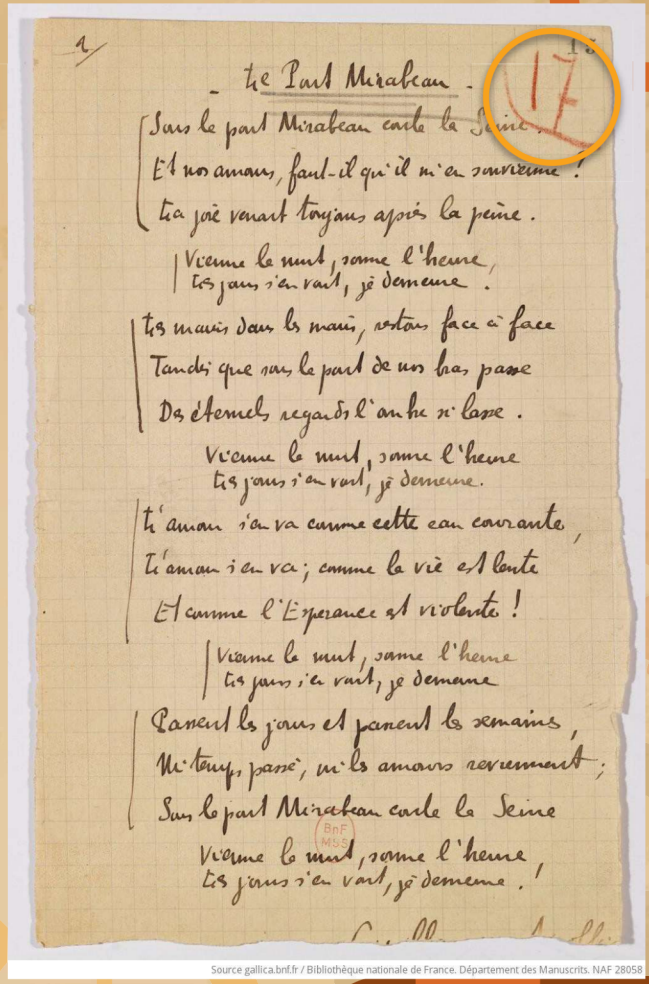
What is textual content?

- the main body of text (different paragraphs, title)
- the handwritten page number?
- the pre-printed page number?



What is textual content?

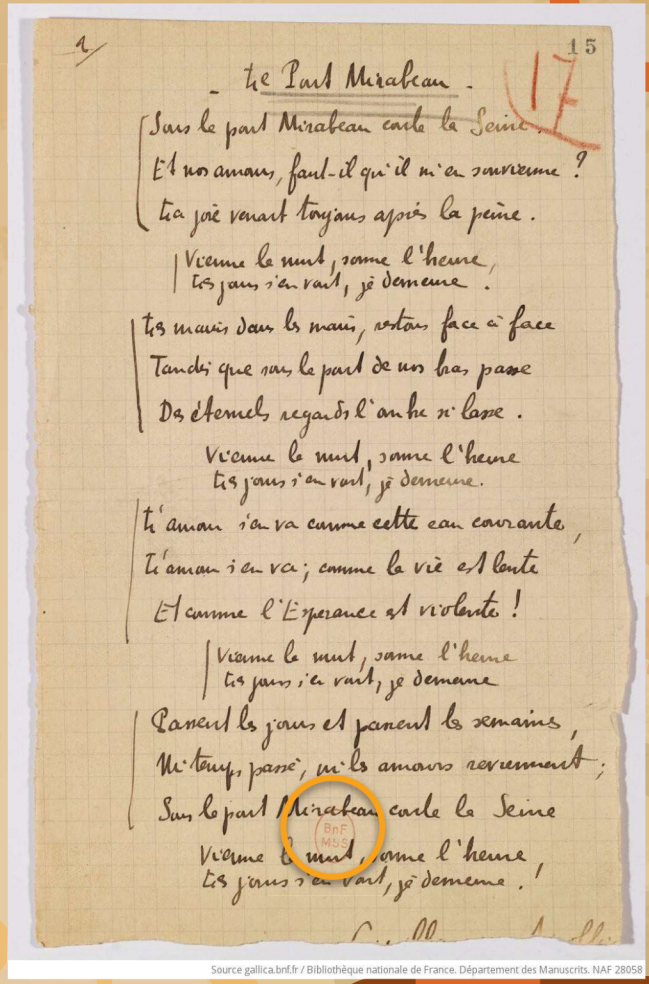
- the main body of text (different paragraphs, title)
- the handwritten page number?
- the pre-printed page number?
- the manual page/inventory number?



Source gallica.bnf.fr / Bibliothèque nationale de France. Département des Manuscrits. NAF 28058

What is textual content?

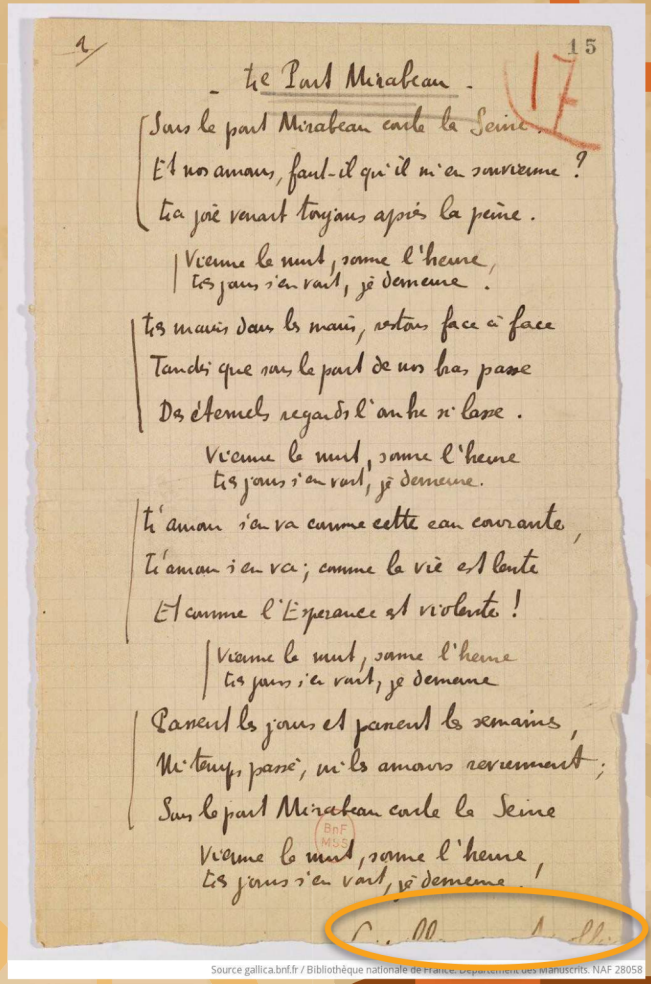
- the main body of text (different paragraphs, title)
- the handwritten page number?
- the pre-printed page number?
- the manual page/inventory number?
- the text in the library stamp?



Source gallica.bnf.fr / Bibliothèque nationale de France. Département des Manuscrits. NAF 28058

What is textual content?

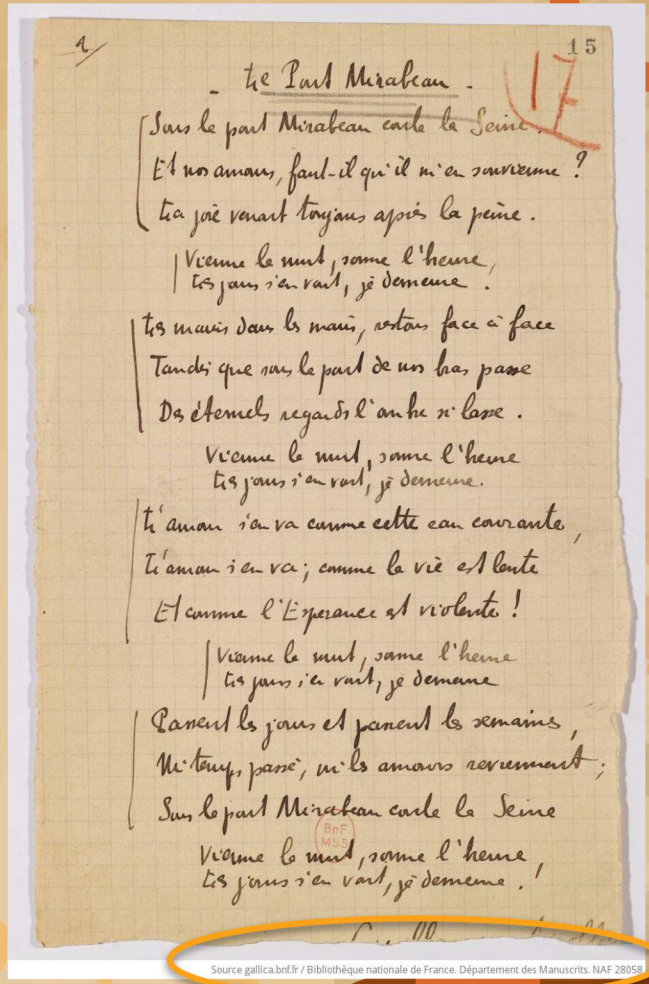
- the main body of text (different paragraphs, title)
- the handwritten page number?
- the pre-printed page number?
- the manual page/inventory number?
- the text in the library stamp?
- the partially illegible text?



Source gallica.bnf.fr / Bibliothèque nationale de France, Département des Manuscrits, NAF 28058

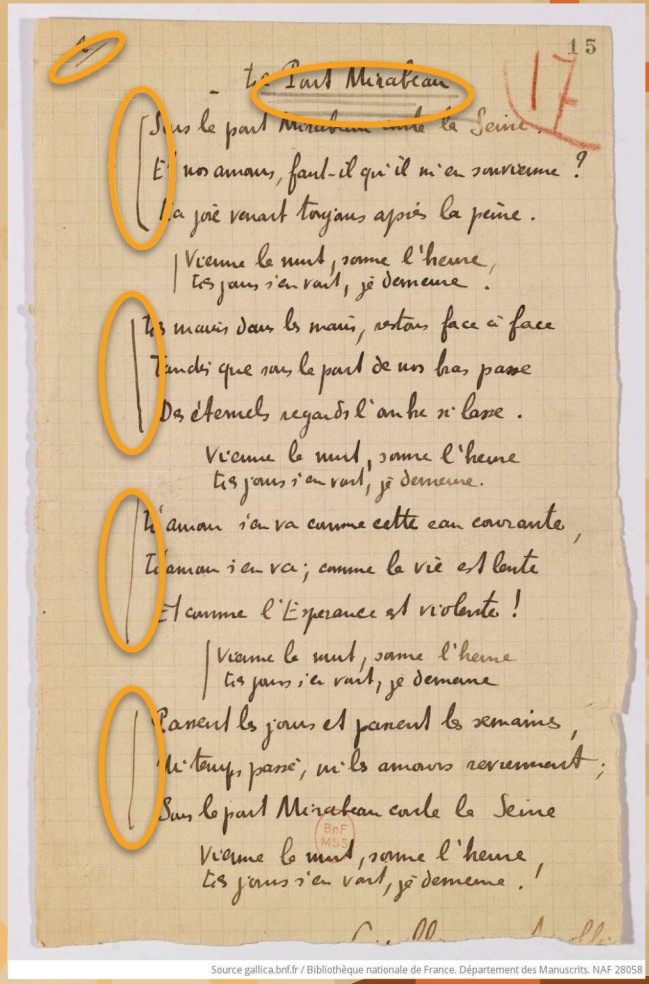
What is textual content?

- the main body of text (different paragraphs, title)
- the handwritten page number?
- the pre-printed page number?
- the manual page/inventory number?
- the text in the library stamp?
- the partially illegible text?
- the credit line from the online library?



What is textual content?

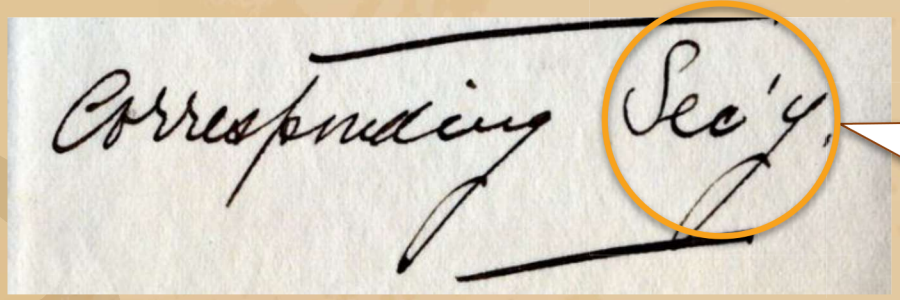
- the main body of text (different paragraphs, title)
- the handwritten page number?
- the pre-printed page number?
- the manual page/inventory number?
- the text in the library stamp?
- the partially illegible text?
- the credit line from the online library?
- underlines? paragraph brackets?



Source gallica.bnf.fr / Bibliothèque nationale de France. Département des Manuscrits. NAF 28058

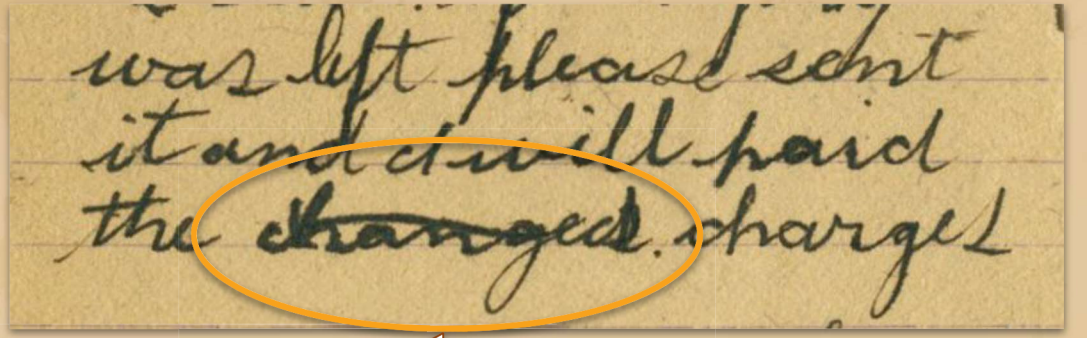
How do we transcribe?

- A **Mademoiselle** Louise Trudelle
- A **M^{lle}** Louise Trudelle
- A **M^{lle}** Louise Trudelle
- A **Mlle** Louise Trudelle
- A **M^lle** Louise Trudelle



- Corresponding **Sec'y.**
- Corresponding **Secretary.**

How do we transcribe?



- the ~~**changed/s**~~ charges
- the charges
- the **changed/s** charges
- the **[[changed/s]]** charges
- the **[[]]** charges
- the **XXX** charges

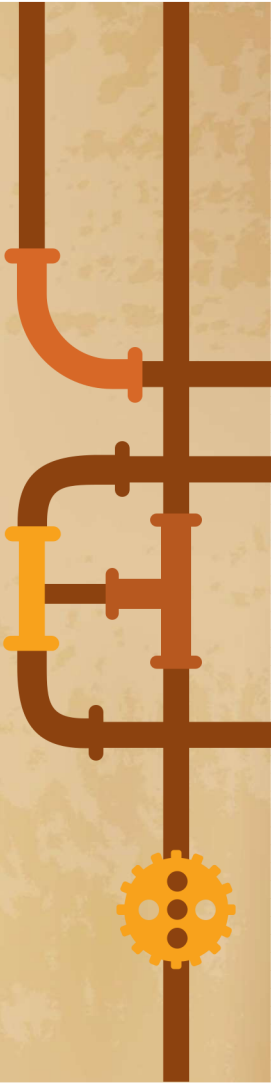
Key takeaways

Transcribing is not self-evident!

- Transcription paradigm (regularized/graphemic/graphetic)
- Choice of characters to render different phenomenons
- Transcription software usually don’t include text formatting

In any case: document your choices, even more so if you are a team of 1 transcribers!!

TWO EXAMPLES OF ATTEMPTS TO HOMOGENIZE PRACTICES

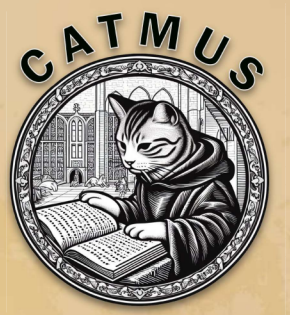


Community: transcription rules

Harmonization of data allows to exchange data and models!

How to ensure that?

- Define transcription methods adapted to a research problem AND to machine learning capacities
- Define the targeted precision/accuracy
- Define a set of characters to render the source and document choices
- Use recommendations from existing projects
  - **CATMuS** : https://catmus-guidelines.github.io



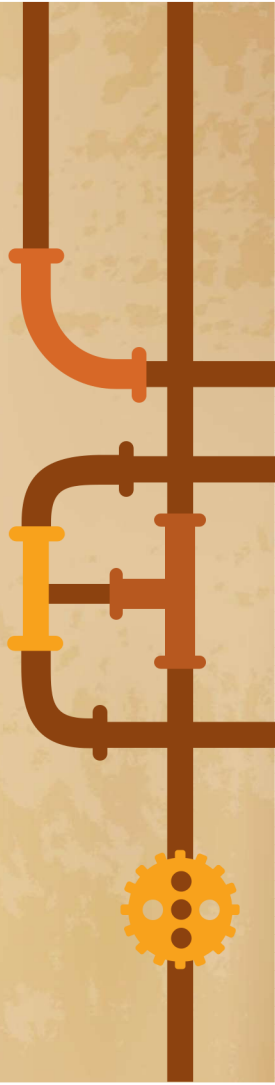
Comunity: layout description

SegmOnto provides guidelines and a controlled vocabulary to describe zones and lines on a page!

- **Lines**: DefaultLine, InterlinearLine
- **Pages**: MainZone, MarginZone, DropCapitalZone
- **Customization syntax**: Name:subtype#number
- **Documentation**: https://segmonto.github.io/

BnF, Fr. 412, fol. 10r

WHAT SOLUTION OFFERS HTR-UNITED?



Why is HTR-United important?

- Need to rely on pre-existing models and pre-existing data
- There is no centralized data warehouse for (gold) HTR datasets
- They are rarely "FAIR":
  - Hard to **Find** and not always **Accessible**
  - uncertain formats and varying annotations rules
  - unclear **Reuse** conditions

https://www.go-fair.org/fair-principles/

Make your data findable!

- Emphasize key aspect of sharing data:
  - Data quality and use of standards
  - Documentation
  - Citation
  - Reusability

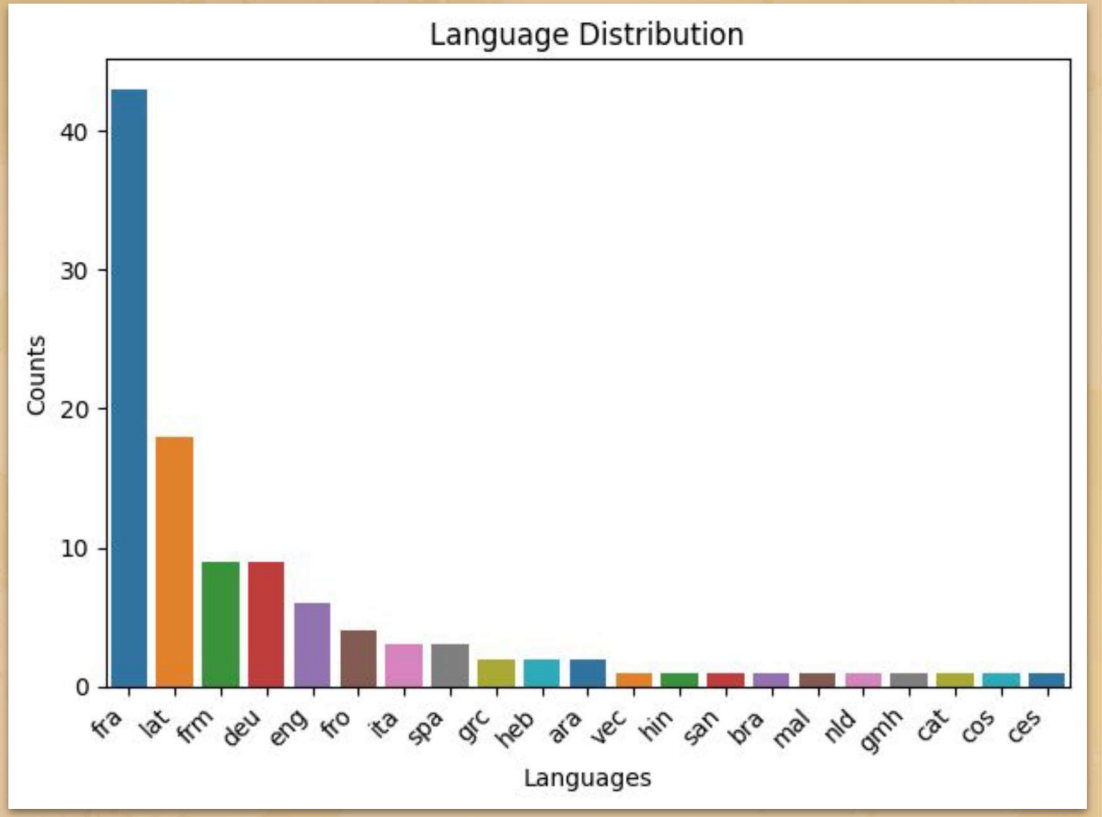
HTR-United in details

- Editors: Alix Chagué & Thibault Clérice
- A catalog browsable by humans and by machines
- Low tech environment for easy maintenance
- An ecosystem of recommendations and tools to ensure data quality
- A catalog fed by data creators
    - Data is published wherever they want
    - A form is filled online to create a structured description
    - The description is reviewed by editors, then added to the catalog
- HTR-United focuses on datasets, not on transcription models

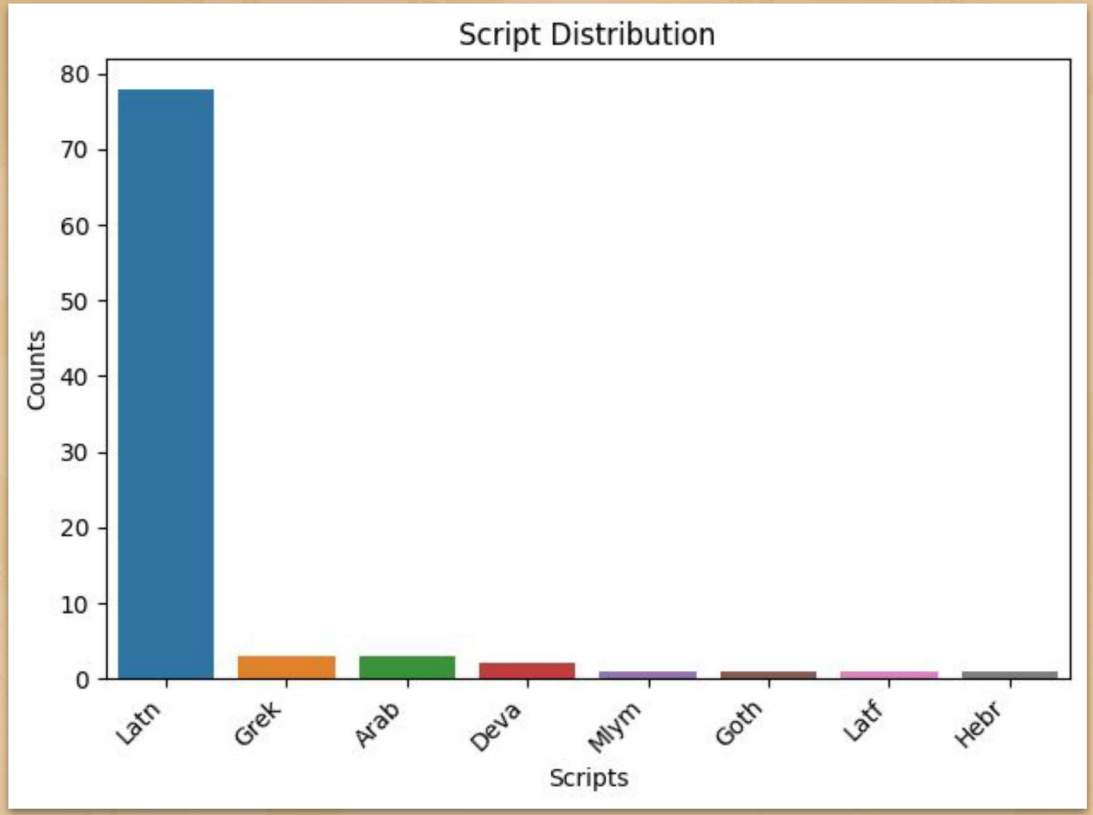
Content of HTR-United (as of April 2024)

- 83 datasets created by at least 38 different projects
- 21 languages (a lot of French (43) and Latin (18)) for 8 scripts (mostly Latin)
- Handwritten *and* printed documents, mixed or not
- A handwriting-period coverage spanning from 800 to 2023
- Created with at least 6 different software (eScriptorium, Kraken, Transkribus ...)
- more than 43M characters, 1M lines or 11K images

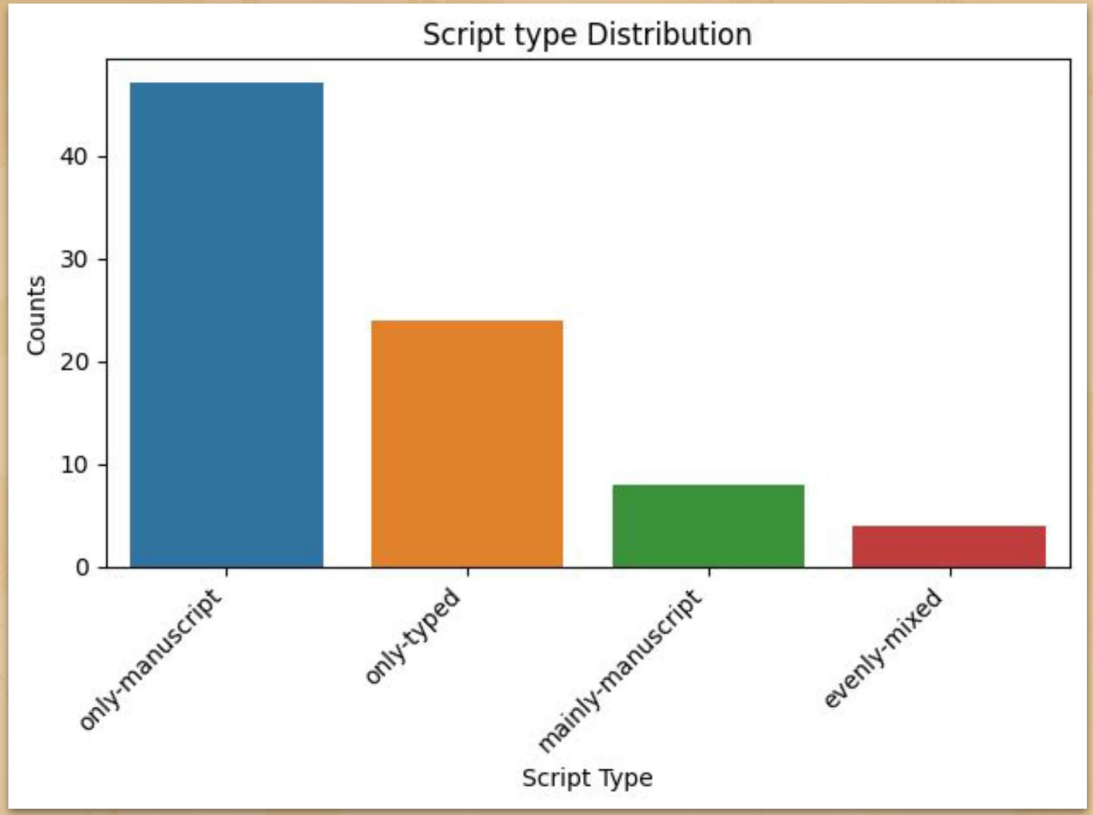
Content of HTR-United (as of April 2024)



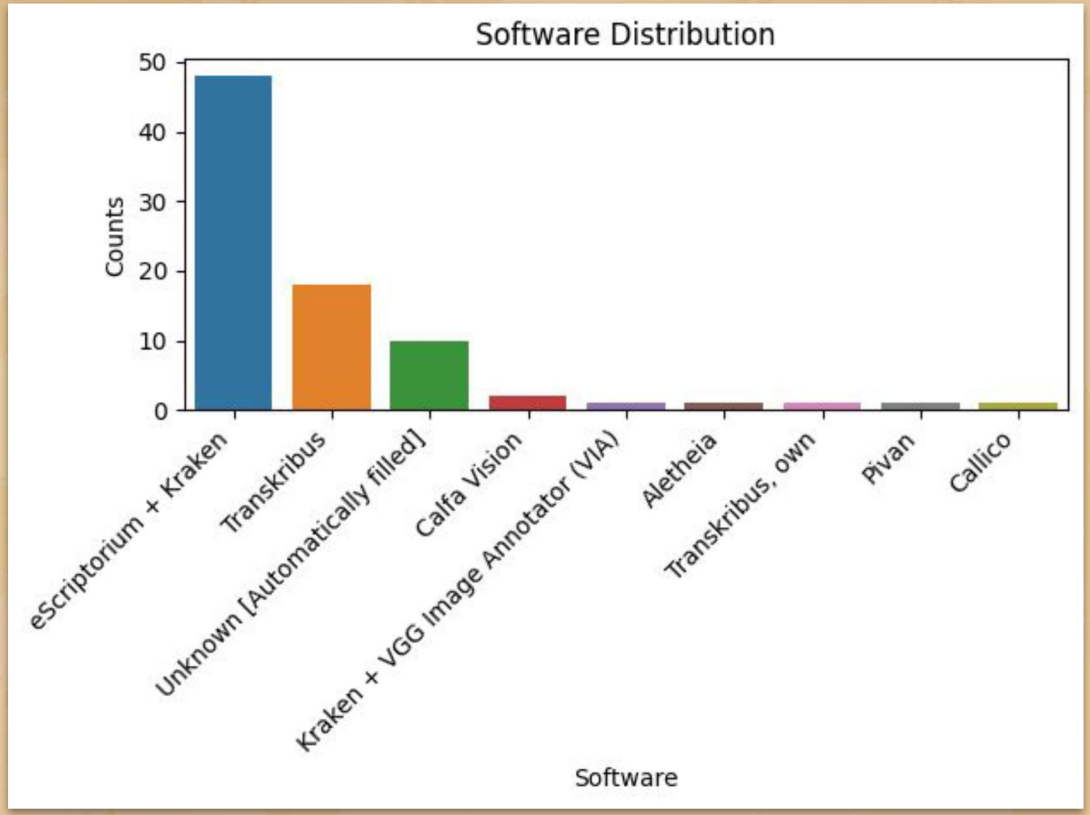
Content of HTR-United (as of April 2024)



Content of HTR-United (as of April 2024)



Content of HTR-United (as of April 2024)



Let’s browse the catalog!

https://htr-united.github.io/

Key takeaway

- HTR technology gains from users forming a community
  - learn faster
  - avoid mistakes
  - homogenize practices
- HTR-United intends to facilitate the creation of this community
  - reliable data
  - community-organized tool
  - transparent process

Thank you!