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ATR: What can eScriptorium do for you?

Alix Chagué, Floriane Chiffoleau

From Source to Full Text: Workshop on Using Automatic Text Recognition (ATR)

September 8th 2023



ALMANaCH project-team

Inria



**Le Mans
Université**

Summary of the presentation


1. Introduction to **ATR software**
2. Guided tour of **eScriptorium**
3. The essence of a good model: **training data**
4. Fantastic **models** (and where to find them)
5. **Predict and assess**: the cornerstone of ATR
6. **Exercise**: Getting acquainted with **eScriptorium**
7. The **eScriptorium documentation**: a helping hand for users
8. **Resources**

Introduction to ATR software

Introduction of the ATR software

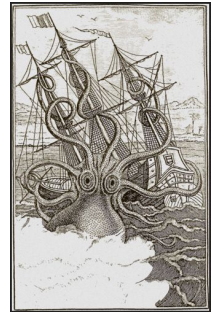
- ❑ ATR or Automatic Text Recognition is the process of transforming a digitized document into a machine-readable text, through the use of **segmentation** and **text recognition** tools
- ❑ Various software for ATR with some specificities:
 - ❑ Proprietary or open source
 - ❑ Printed documents, handwritten documents or both
 - ❑ Charged, freemium, free
- ❑ Example of open-source, semi-free OCR engine:
 - ❑ [Tesseract](#) (no interface)
 - ❑ [Transkribus](#) (interface) + [PyLaia](#) (transcription engine)
 - ❑ [eScriptorium](#) (interface) + [Kraken](#) (transcription engine)

Guided tour of eScriptorium



Guided tour of eScriptorium

- ❑ eScriptorium is an open-source software (web application), for transcribing textual documents, developed by the research team Scripta (PSL).
- ❑ It provides a **graphical user interface** (GUI) for:
 - ❑ **document management**,
 - ❑ **layout annotation (aka segmentation)**,
 - ❑ **transcribing** (manually or automatically),
 - ❑ and **training models**.
 - ❑ and more!
- ❑ It uses Kraken (Benjamin Kiessling - PSL) as a transcription engine. Kraken is language-agnostic and fully open source.



eScriptorium

eScriptorium: A Digital Text Production Pipeline for Print and Handwritten Texts using machine learning techniques.



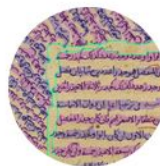
Automatic Transcription

Apply OCR/HTR to images of printed and handwritten documents using shared open models.



Manual transcription

Make use of an ergonomic user interface leveraging modern browser technology to edit segmentations and transcriptions.



Train Models

Create new models or finetune existing ones to improve automatic recognition.



Import/Export

Import and export models and texts transcriptions in a variety of formats. Access data through a full REST API.

Sandbox project

Documents

Reports

Get overall metrics on the project's content

Create new Document



Filters



demo

Select	Preview	Name	Owner	Last modified	Image count	Tags	Actions
<input type="checkbox"/>		Gallery of Fashion (01/1800)	demo_tutorial	Sept. 1, 2023	5 images.	demo	
<input type="checkbox"/>		Another project	demo_tutorial	Sept. 4, 2023	8 images.		

Dynamically filter the list of documents

Projects contain **documents**, which contain images (or **document parts**)

Edit the document (transcribe, add images, add metadata, etc...)

Access to my other projects

Access to my created or uploaded models

Drop images here or click to upload.

Image import

Select all Unselect all Selected 0/141 Import Export Train Binarize Segment Transcribe

Status of the segmentation and transcription

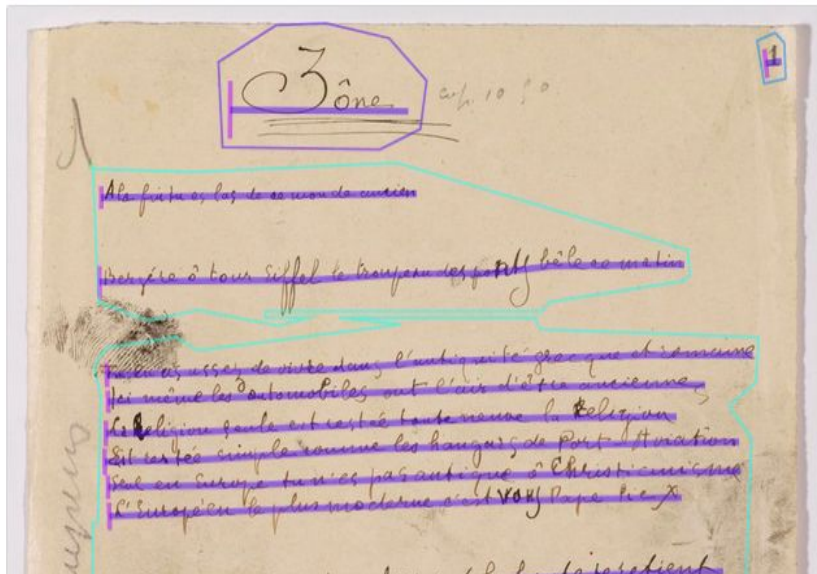
manual

- kraken:model_24
- kraken:model_41
- kraken:model_5
- kraken:generic_lectarep_26
- kraken:lectarep_base_best
- kraken:generic_lectarep_26_v3
- ✓ manual

Different transcriptions available

Segmentation

Transcription



A la fin tu es las de ce monde ancien

Bergère ô tour Eiffel le troupeau des ponts bêle ce matin

Tu en a assez de vivre dans l'antiquité grecque et romaine
Ici même les automobiles ont l'air d'être anciennes
La Religion seule est restée toute neuve la Religion
Est restée simple comme les langues de Port-Aviation
Seul en Europe tu n'es pas antique ô Christianisme
L'Européen le plus moderne c'est vous Pape Pie X

... et la honte te retient

ATR software are similar because the workflow is close

The screenshot displays the Transkribus web interface. On the left, a document image is shown with a green segmentation box around the top portion. A red arrow labeled "Segmentation" points to this box. The document text includes "COPIE", "LÉGATION de GÉORGIE", "Paris, September 22nd 1921.", "44, avenue Victor Hugo. (16e)", "The Carnegie Foundation.", "24, rue Pierre Curie.", "PARIS", "Sirs.", and several paragraphs of text starting with "I have the honor, in the name of the government of the Georgian Republic...". On the right, a transcription window shows the corresponding text, with a red arrow labeled "Transcription" pointing to it. The transcription includes the header "REGION 1" and "COPINES", followed by the same text as the document image. The interface also shows a top navigation bar with "Transkribus", "Workshop...hiffouleu", "Letters 555bis-878", "#1", "Feedback", "In Progress", a date "10.7.2023, 16:15", and a share icon.

The essence of a good model: training data

The essence of a good model: training data

- ❑ What is training data ? → Sets of images and their exact transcription (for text recognition) or layout structure (for layout recognition), used to train models
- ❑ There are two categories of training data:

GOLD CORPUS

manual annotation (layout or text) or corrected prediction

SILVER CORPUS

automatic prediction (with a model) without correction

The essence of a good model: training data

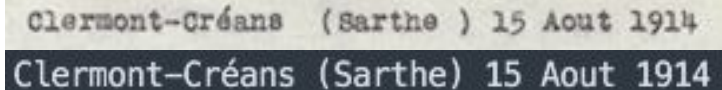
- ❑ Three formats for the training data:
 - ❑ Sets of ALTO XML files and their images
 - ❑ Sets of PAGE XML files and their images
 - ❑ Sets of text line images and their transcription
- ❑ In each case, same filename, different extension (xml/txt, jpg/png/tiff)

Example of a line from an ALTO XML

```
<TextLine ID="eSc_line_3b2a0fba"  
  BASELINE="703 102 1507 108" HPOS="701.0" VPOS="73.0" WIDTH="806.0" HEIGHT="69.0">  
  <Shape><Polygon POINTS="703 102 701 135 1052 129 1080 139 1082 139 1084 139 1085 139 1106 129 1124 140 1126 140 1128 140  
  1129 140 1144 140 1267 133 1413 142 1432 142 1433 142 1439 142 1481 133 1501 142 1507 108 1505 76 703 73 703 102"/></  
  Shape>  
<String CONTENT="Clermont-Créans (Sarthe) 15 Aout 1914" HPOS="701.0" VPOS="73.0" WIDTH="806.0" HEIGHT="69.0"></String>  
</TextLine>
```

Example of a line from a PAGE XML

```
<TextLine id="eSc_line_3b2a0fba" >  
  <Coords points="703,102 701,135 1052,129 1080,139 1082,139 1084,139 1085,139 1106,129 1124,140 1126,140 1128,140 1129,140  
  1144,140 1267,133 1413,142 1432,142 1433,142 1439,142 1481,133 1501,142 1507,108 1505,76 703,73 703,102"/>  
  <Baseline points="703,102 1507,108"/>  
  <TextEquiv>  
    <Unicode>Clermont-Créans (Sarthe) 15 Aout 1914</Unicode>  
  </TextEquiv>  
</TextLine>
```



Clermont-Créans (Sarthe) 15 Aout 1914
Clermont-Créans (Sarthe) 15 Aout 1914

Set of a text line image and its transcription

The essence of a good model: training data

- ❑ Additionally to your own training data, you can find other training data online, such as thanks to the [HTR-United](#) catalog
- ❑ It contains metadata on training datasets available for the creation of transcription or segmentation models



Cremma Medieval

CremmaLab
1100 - 1499

[Link](#) Data repository [Link](#) Citation File (CFF)

Language fra Language fro Script Latn Script Type only-manuscript

Hands 1-per-folder

Volume 630 607 characters Volume 289 files Volume 23 630 lines

Volume 1 932 regions Known characters (NFD) 96

License CC-BY 4.0

Software eScriptorium + Kraken

Transcription corpora for training HTR models for medieval manuscripts from the 12th to the 15th century.

Authors: Pinche, Ariane and Camps, Jean-Baptiste and Mariotti, Viola and Nolibois, Alice and Carnaille, Camille and Deleville, Prunelle and Lecomte, Sophie and Meylan, Aminoel and Ventura, Simone and Dugaz, Lucien

[Complete record](#) [# Tweet](#)

Fantastic models (and where to find them)

Fantastic models (and where to find them)

- ❑ What is a model ? → It is a file that has been trained to recognize certain types of patterns.
- ❑ A model can be developed for 2 types of process
 - ❑ **Layout recognition** → Process that determines the constituents of an image and locates the regions and lines of the document where data have been written
 - ❑ **Text recognition** → Process that recognizes the characters in document lines and produces a machine-readable text
- ❑ Specific to the software that produced them (no standardization)



blla.mlmodel



CREMMA-Medieval_best_V1-0-0.
mlmodel

Fantastic models (and where to find them)

Where to find them ?

- ❑ For Kraken and eScriptorium
 - ❑ In the tab “My models” on eScriptorium → it contains public models, available for every user and the models the user uploaded/trained themselves
 - ❑ In the repository “[OCR/HTR model](#)” created on Zenodo
- ❑ For other software
 - ❑ Inside software, but not downloadable (Transkribus, FineReader, etc.) (most common case)
 - ❑ Along with software source code (Tesseract)

My Models

Upload a model

	Role	Script	Size	Trained from	Training Status	Accuracy	Errors	Right	
generic_lectau_nfd_rs_26	Recognize		15.4 MB		✓	82.5%	-	User	
Generic CREMMA Model for Medieval Manuscripts (DOI 10.5281/zenodo.7631619)	Recognize	Latin Q	21.7 MB		✓	91.3%	-	Public	
GalliCorpora+ (French Early Modern Print) (DOI 10.5281/zenodo.7410359)	Recognize	Latin Q	15.5 MB		✓	96.6%	-	Public	
HTR-United-Manu McFrench V1 (DOI 10.5281/zenodo.6657808)	Recognize	Latin Q	15.4 MB		✓	90.6%	-	Public	
HTR-United-Manu McFrench V3 (DOI 10.5281/zenodo.6657808)	Recognize	Latin Q	21.7 MB		✓	90.3%	-	Public	
finetune_modelpec_9360_NFC	Recognize		16.6 MB		✓	93.6%	-	Owner	
modelpec_9378_NFC	Recognize		16.6 MB		✓	93.8%	-	Owner	

OCR/HTR model repository

Recent uploads



July 28, 2023 (V2)

Other

Open Access

View

Transcription model for Lucien Peraire's handwriting (French, 20th century)

Alix Chagué;

This model was trained on the peraire-ground-truth dataset (v.2.0.0) and using Manu McFrench as a base model. The peraire-ground-truth dataset contains documents written in French by Lucien Peraire in the late 1920s and in the late 1960s. For more details on the dataset and the transcription [guideli](#)

Uploaded on July 28, 2023

May 13, 2023 (v1)

Other

Open Access

View

HTR model for German manuscripts trained from several datasets

Stefan Weil;

This German handwriting recognition model has been trained with ground truth from different sources. It is based on a

New upload

OCR/HTR model repository

A repository of OCR/HTR models with metadata assisting in model selection.

Curated by:

bkiessling

Curation policy:

We're accepting any inclusion request with a valid metadata file. This will eventually be automated when the Zenodo REST API supports community curation.

Created:

February 26, 2019

Harvesting API:[OAI-PMH Interface](#)

Choose a model

All All engines

1-25 / 152 1 7

Name	Language	Curator	Technology	Created	nrOfWords	CER Train	CER Validation	ID
Montenegrin/Serbian Cyril...	cnr,srp	philipp.wasser...	PyLaia	16.08.23	38223	1.10%	0.20%	54383
Rezesse niederdeutscher S...	deu	info@fgho.eu	PyLaia	20.07.23	124051	2.70%	4.90%	53623
Notaires montréalais (Can...	fra	dominique.de...	PyLaia	18.07.23	127914	5.50%	11.00%	53554
Test model Chinese	zho	m.elattal@rea...	PyLaia	04.07.23	16557	7.01%	7.50%	53245
Felix Salten (1869–1945)	deu	martin.anton...	PyLaia	30.06.23	38911	6.30%	10.40%	53151
Stockholm Notaries 1700 ...	swe	handskrifter.st...	PyLaia	29.06.23	1390979	2.40%	1.71%	53149
NIOD_WarLet_1935-1950	nld	brievoproject...	PyLaia	26.06.23	177850	4.80%	4.60%	53102
The English Eagle	eng	b.anzinger@re...	PyLaia	23.06.23	3822933	8.50%	8.30%	53042
19th-century Romanian Tr...	ron	brangheorghe...	PyLaia	15.06.23	29859	1.50%	2.70%	52851
OldOccitanHandwriting	pro	marinus.wiedn...	PyLaia	14.06.23	192034	2.60%	3.51%	52822
SPJCL17C V4.2	por	dsilver2@tam...	PyLaia	12.06.23	64324	1.00%	5.60%	52754
Noscemus GM 6	Lat,grc,deu	stefan.zatham...	PyLaia	06.06.23	667127	0.60%	0.80%	52640
OttomanTurkish_Print_1	ota	sufhankirmizi...	PyLaia	29.05.23	180854	4.30%	7.21%	52502
Swedish 17th century (Sav...	swe	v.kaarainen@...	PyLaia	20.05.23	470065	4.00%	3.80%	52321
Ukrainian generic handwri...	ukr	tikhonal@hu...	PyLaia	03.05.23	100079	2.60%	4.20%	51906
Icelandic late 18th century...	isl	emg22@hi.is	PyLaia	30.04.23	246460	3.31%	3.10%	51792
19th century Icelandic	isl	emg22@hi.is	PyLaia	30.04.23	248699	4.60%	5.20%	51788
RTA2 (Romanian Transiti...	Romanian	m.elattal@rea...	PyLaia	19.04.23	10250	2.00%	2.80%	51515
19th century Danish Gothi...	dan	sbch@aarhus.dk	PyLaia	14.04.23	984735	6.70%	6.70%	51398
Carolingian Minuscule Mo...	lat	tim.geelhaar@...	PyLaia	07.04.23	179520	3.10%	5.20%	51210
The Text Titan I	deu,nld,fra...	Unknown	N/A	05.04.23	0	N/A	2.95%	51170
Slovenian 18th century ma...	slv,lat	marko.kunavar...	PyLaia	04.04.23	25322	0.50%	2.80%	51128
The German Giant I	deu	b.anzinger@re...	PyLaia	20.03.23	15420976	9.80%	8.30%	50870
Early Kurrent Emmerer I	deu	b.anzinger@re...	PyLaia	20.03.23	6414004	10.70%	8.00%	50856

25 Filter

Details

Name: Noscemus GM 6 Language: Lat,grc,deu

Description: The "Noscemus General Model" is tailored towards recognizing Latin prints from the early modern period. Although the model is designed to recognize Latin prints set in Antiqua-

Parameters: Max epochs: 250
Early stopping: 20
Epochs trained: 91
Learning rate: 0.0003
Batch size: 24

Document Type: Print Show advanced parameters...

Nr. of Words: 667127 Nr. of Lines: 101526

Save Show Train Set Show Validation Set Show Characters

Learning Curve

CER on Train Set: 0.60% CER on Validation Set: 0.80%

OK Cancel

tesseract-ocr / tessdata

Search: Type to search

Code Issues 45 Pull requests 2 Actions Projects Wiki Security Insights

tessdata Public Watch 227 Fork 2k Star 5.4k

main 1 branch 4 tags Go to file Add file Code

stweil ita: Remove ita.config from ita.traineddata (fix issue #18) 4767ea9 on Nov 30, 2020 44 commits

script	Add scripts from tessdata_best (converted to fast integer models)	5 years ago
tessconfigs @ 3decf1c	Update tessconfigs	4 years ago
.gitmodules	Update URL for tessconfigs submodule (use HTTPS)	4 years ago
LICENSE	Add Apache license file	4 years ago
README.md	Update README.md	3 years ago
afr.traineddata	Update LSTM Models to integerized tessdata_best for files < 25mb	5 years ago
amh.traineddata	Update LSTM Models to integerized tessdata_best for files < 25mb	5 years ago
ara.traineddata	remove legacy model from indic and arabic script languages	5 years ago
asm.traineddata	remove legacy model from indic and arabic script languages	5 years ago
aze.traineddata	Update LSTM Models to integerized tessdata_best for files < 25mb	5 years ago

About

Trained models with fast variant of the "best" LSTM models + legacy models

ocr tesseract

Readme Apache-2.0 license Activity 5.4k stars 227 watching 2k forks Report repository

Releases 3

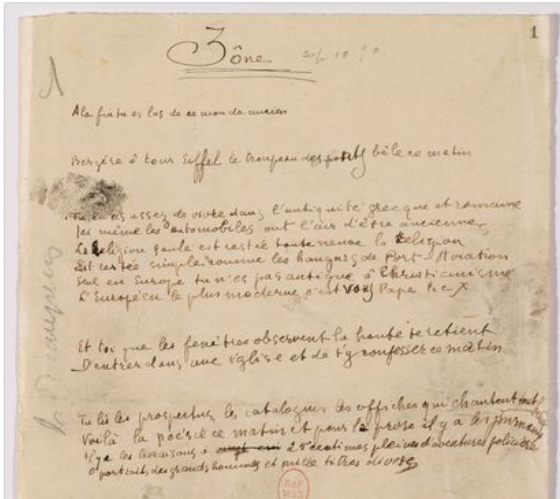
Release 4.1.0 Latest on Feb 16, 2021

Predict and assess: the cornerstone of ATR

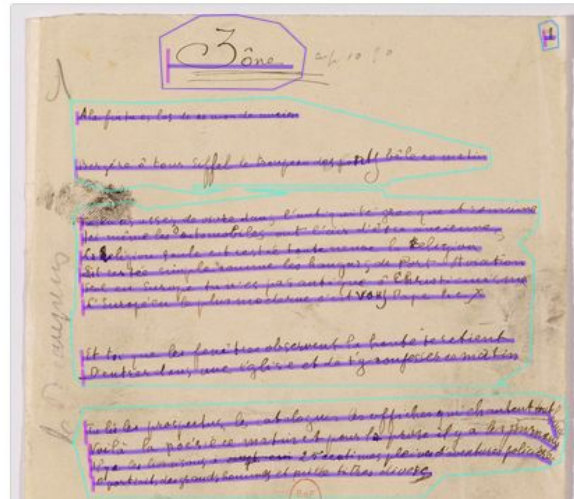
Predict the transcription

- A prediction is the act of using a model to generate (or predict) a layout recognition or a text recognition using an image and a segmentation/transcription model.

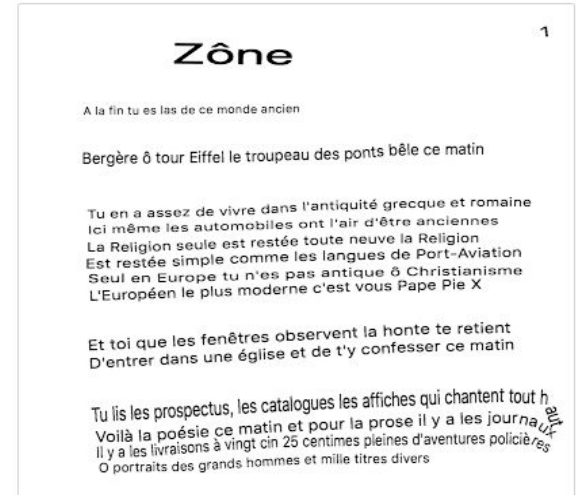
Image



Layout



Text



Assess the transcription

- ❑ How to assess?
 - ❑ Eyeballing the result (Can I read it?)
 - Does it look gibberish?
 - ❑ Using metrics
 - ❑ CER : Character Error Rate
 - ❑ WER : Word Error Rate
- ❑ How to go deeper?
 - ❑ [KaMI-Lib](#) or [CERberus](#) : ways to nuance the evaluation (caps, digits, diacritics, etc.)
- ❑ How to obtain your metrics (from the example below)
 - ❑ CER → 25 characters, 4 incorrect characters, CER = 16% ($4/25 * 100$)
 - ❑ WER → 5 words, 2 incorrect words, WER = 40% ($2/5 * 100$)

LA SIGNATURE de la PAIX .
LA SIGTCNATURBE de la PAITX .

Exercise: Getting acquainted with eScriptorium

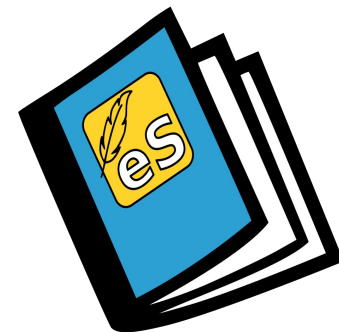
Exercise: Getting acquainted with eScriptorium

1. Go to the website: escriptorium.inria.fr/
2. Login in eScriptorium:
 - Username: apinche_formation
 - Password: training1234
3. Go to the project: Pinche_FormationDHI
4. Create a new document
 - Name: “workshopdhi_” + your last name
→ example: “workshopdhi_chiffoleau”
 - Parameters: “Latin”, “Baseline” and “Left to right”
5. Take a look at the models already present on the account
 - “My models”

The eScriptorium documentation: a helping hand for users

The eScriptorium documentation: a helping hand for users

- ❑ The tutorial aims to provide a **set of (written) walkthroughs detailing eScriptorium's features**, for example:
 - ❑ Managing projects and collections of documents,
 - ❑ Learning how to segment, annotate and transcribe a text image,
 - ❑ Instructions for training models.



The tutorial is available at <https://escriptorium-tutorial.readthedocs.io>

All collaborations are welcomed: <https://github.com/alix-tz/escriptorium-tutorial>



Home

Contribute to the documentation

About this documentation

QUICK-START

Quick-start

FAQ

WALKTHROUGH

Import data

Automatic prediction

Manual segmentation

Manual transcription

Manual annotation

🏠 » Home

[Edit on GitHub](#)

Next ➔

eScriptorium is a web application offering a workspace to manage the various steps of a transcription campaign. These steps can involve manual or automatic processes and be applied to printed documents or handwritten ones. The application uses **Kraken** as a segmentation/transcription engine. Since its beginning in 2019, the **SCRIPTA PSL** research group is responsible for its creation and development.

You can find more information about eScriptorium and the context of its production in:

- Stokes, P., B. Kiessling, D. Stökl Ben Ezra, R. Tissot, and E. H. Gargem. "The EScriptorium VRE for Manuscript Cultures." Edited by Claire Clivaz and Garrick V. Allen. *Classics@ Journal, Ancient Manuscripts and Virtual Research Environments*, 18 (2021). <https://classics-at.chs.harvard.edu/classics18-stokes-kiessling-stokl-ben-ezra-tissot-gargem/>.

The goal of this documentation is to facilitate learning how to use the application as beginners or advanced users.

Quick start

Resources

Resources

- ❑ eScriptorium: <https://escriptorium.inria.fr/>
- ❑ eScriptorium documentation:
<https://escriptorium.readthedocs.io>
- ❑ Kraken: <https://kraken.re/main/index.html>
- ❑ OCR/HTR models:
https://zenodo.org/communities/ocr_models
- ❑ CERberus:
<https://github.com/WHaverals/CERberus>
- ❑ HTR-United: <https://htr-unity.github.io/>
- ❑ KaMILib:
<https://huggingface.co/spaces/lterriell/kami-app>
- ❑ PyLaia: <https://github.com/jpuigcerver/PyLaia>
- ❑ Tesseract:
<https://github.com/tesseract-ocr/tesseract>
- ❑ Transkribus: <https://app.transkribus.eu/>

Thank you for your attention

Any questions ?

Contact: [alix.chague\[at\]inria.fr](mailto:alix.chague@inria.fr)
[floriane.chiffoleau\[at\]inria.fr](mailto:floriane.chiffoleau@inria.fr)