



AIKON

Computer Vision Platform for Digital Humanities

Ségolène Albouy*, Jade Norindr*, Fouad Aouinti*, Clara Grometto, Robin Champenois,
Stavros Lazaris, Alexandre Guilbaud, Matthieu Husson, Mathieu Aubry



Funded by
the European Union



erc
European Research Council
Established by the European Commission

École des Ponts ParisTech

<https://aikon.enpc.fr>



ANR EnHerit, VHS, EIDA

ERC DISCOVER

01 Discover project

Développer des outils pour découvrir des structures cohérentes dans les corpus visuels

02 AIKON demo

Plateforme de démonstration des modèles développés pour différentes applications historiques

03 AIKON platform

Interface web conçue pour la gestion, le traitement et l'analyse de corpus de documents historiques



Des besoins récurrents

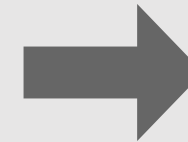
- Détection de filigranes
- Étude de la dissémination de photographies
- Identification des bois gravés
- Analyse des types d'écriture
- Reconnaissance de motifs de copies

Tâches automatisable

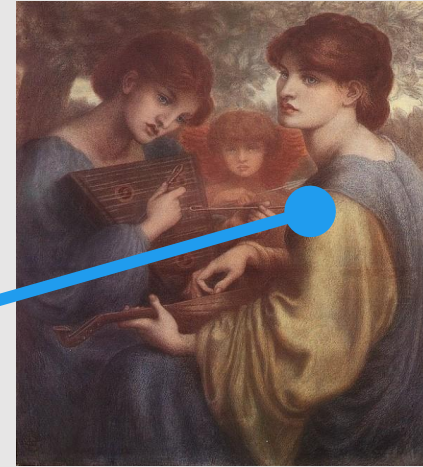
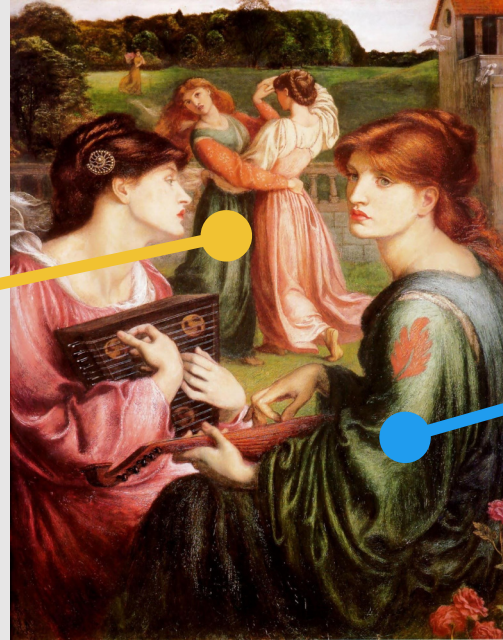
- Repérage automatique d'éléments visuels
- Calcul des similarités
- Classification

DISCOVER <https://erc-discover.github.io/>

Discovering and Analyzing Visual Structures



Quelles sont les différentes structures visuelles cohérentes dans ces images ?





ve fit, tam ratione formæ, quam materiae
Hac poterit lector sospes adire uia.
 dū cali mouebatur: aues argenteas: in solaris lapidē



a	A
b	B
c	C
d	D
e	E
f	F
g	G
h	H
i	I
j	J
k	K
l	L
n	M
n	N
o	O
p	P
q	Q
r	R

Antiqua font

antwortet vnd sagt zu inen/ Gehet hin/ vñ verführe
 Augen wol auff/ erforsche alle Sachen mit fleiß/ wirst du die Sachen also besinn.
 So thue ich auch nicht vnrecht/ das ich mich schreibe von Jerusaz



a	2
b	3
c	4
d	5
e	6
f	7
g	8
h	9
i	1
j	2
k	3
l	4
n	5
n	6
o	7
p	8
q	9
r	0

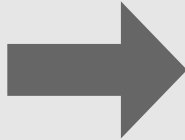
Fraktur font

Exigo mei curā ago dolonē
 eēt. 7 fit p̄dic̄ p̄ ihennā
 homines æ su ueniat



a b c d e f g h i j k l m n o p q r

Textualis script



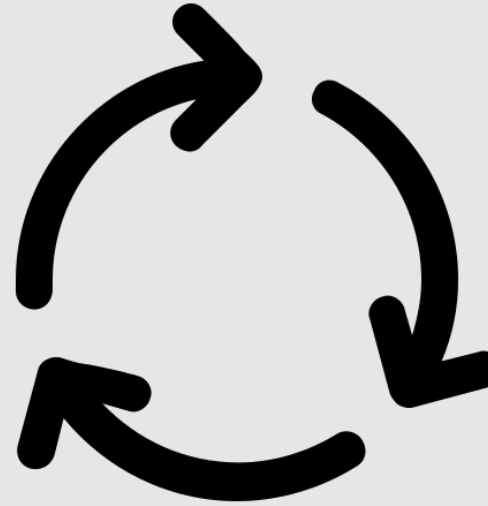


Formalisation d'une tâche pour analyse iconographique

1
Problem

Création d'un modèle à partir de données synthétiques

2
Training



3
Finetuning

Amélioration du modèle grâce aux résultats corrigés



Extraction d'éléments visuels



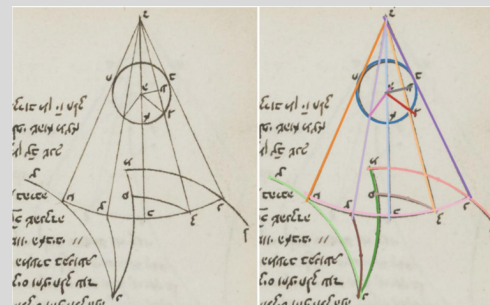
docExtractor: An off-the-shelf historical document element extraction
T. Monnier, M. Aubry
ICFHR 2020

Détection de motifs de copies



Learning Co-segmentation by Segment Swapping for Retrieval and Discovery
X. Shen, A. Efros, A. Joulin, M. Aubry,
CVPR 2022 workshops

Vectorisation de diagrammes



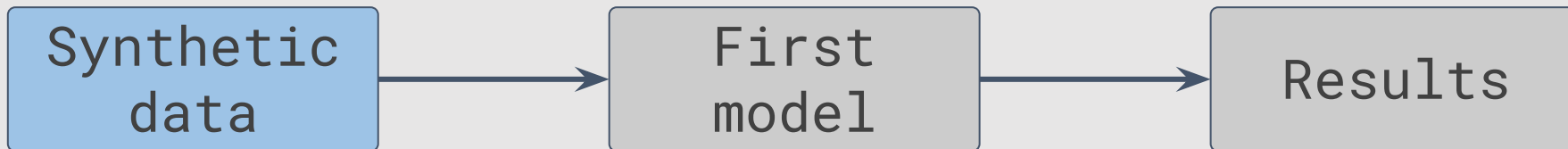
Historical Astronomical Diagrams Decomposition in Geometric Primitives
S. Kalleli, S. Trigg, S. Albouy, M. Husson, M. Aubry
ICDAR 2024

Reconnaissance de caractères



General Detection-based Text Line Recognition
R. Baena, S. Kalleli, M. Aubry,
NeurIPS 2024

2 Training

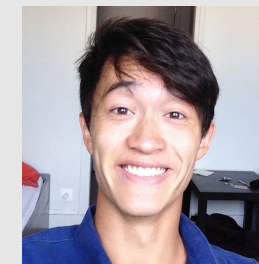


Extraction d'éléments visuels



docExtractor: An off-the-shelf historical document element extraction

T. Monnier, M. Aubry
ICFHR 2020

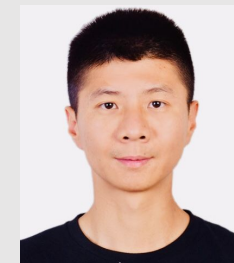


Détection de copies



Learning Co-segmentation by Segment Swapping for Retrieval and Discovery

X. Shen, A. Efros, A. Joulin, M. Aubry,
CVPR 2022 workshops



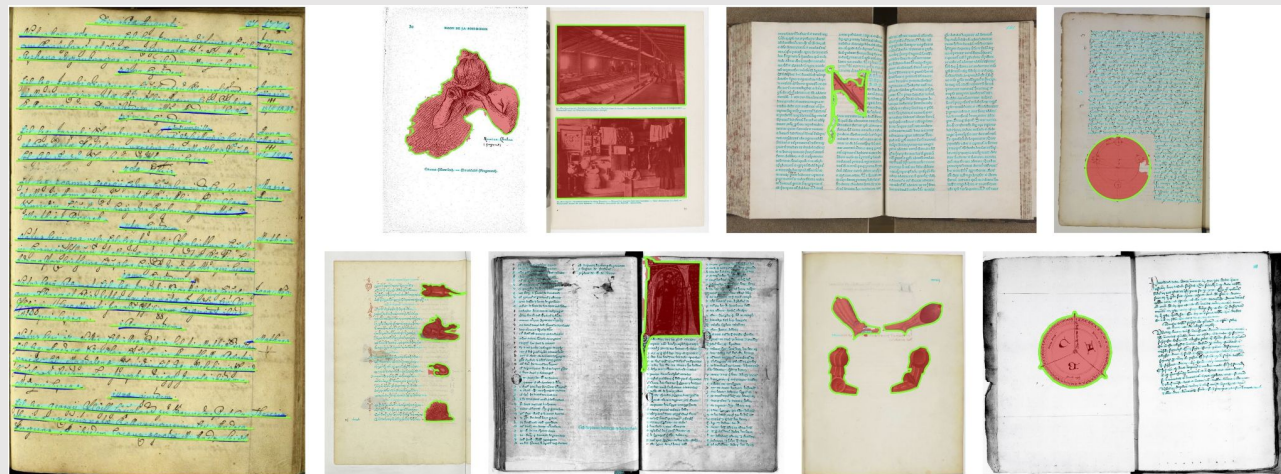
2 Training

Synthetic data

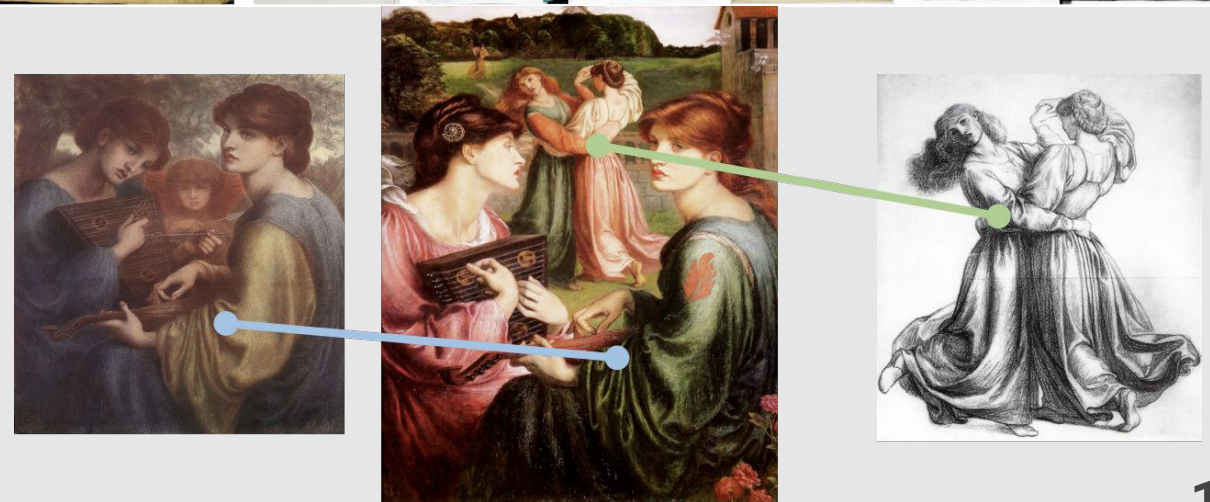
First model

Results

Extraction d'éléments visuels



Détection de copies

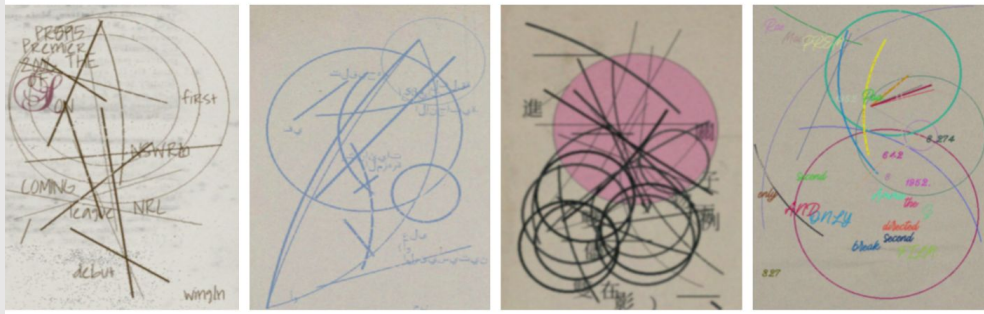
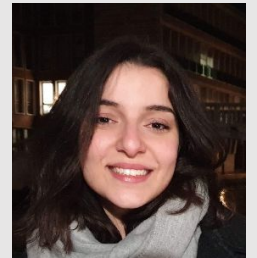


2 Training

Synthetic data

First model

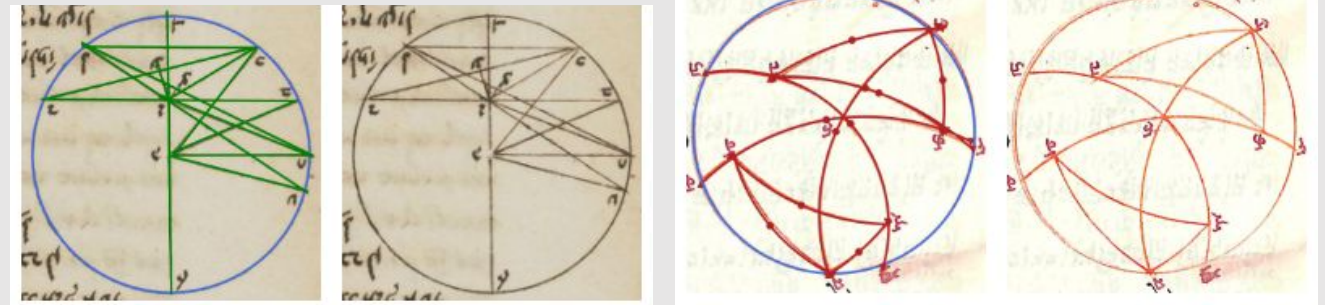
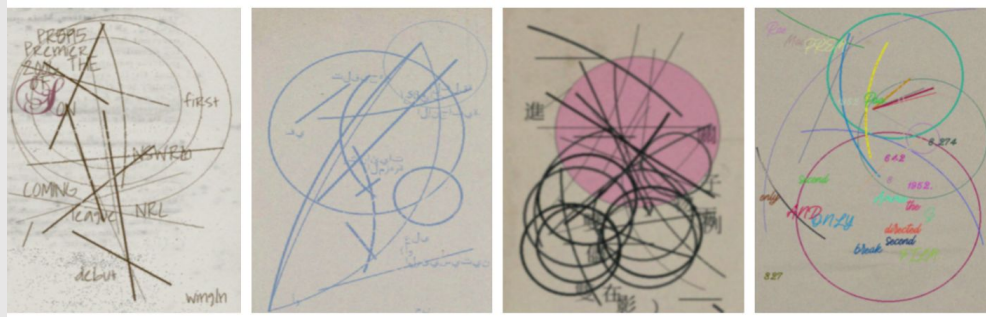
Results

Vectorisation de diagrammes**Historical Astronomical Diagrams Decomposition in Geometric Primitives**S. Kalleli, S. Trigg, S. Albouy, M. Husson, M. Aubry
ICDAR 2024**Reconnaissance de caractères****General Detection-based Text Line Recognition**R. Baena, S. Kalleli, M. Aubry,
NeurIPS 2024

2 Training



Vectorisation de diagrammes

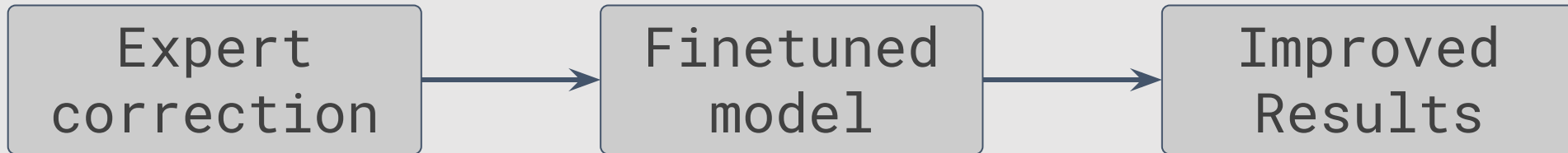


Reconnaissance de caractères





3 Finetuning



Comment obtenir des annotations expertes ?



Besoins

- Création de *datasets* standardisés
- Utilisation d'algorithmes sans prérequis techniques
- Validation et correction des résultats
- Environnement collaboratif interdisciplinaire



Ambition

- **Modularité**

Créer des outils polyvalents pour tout corpus visuel

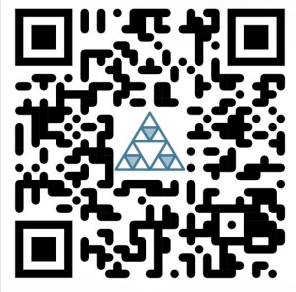
Du chercheur individuel aux projets de large envergure

- **Collaboration**

Partage des développements, des modèles et données

Établissement de méthodes et bonnes pratiques

→ Objectif de faciliter l'analyse
par vision artificielle en SHS



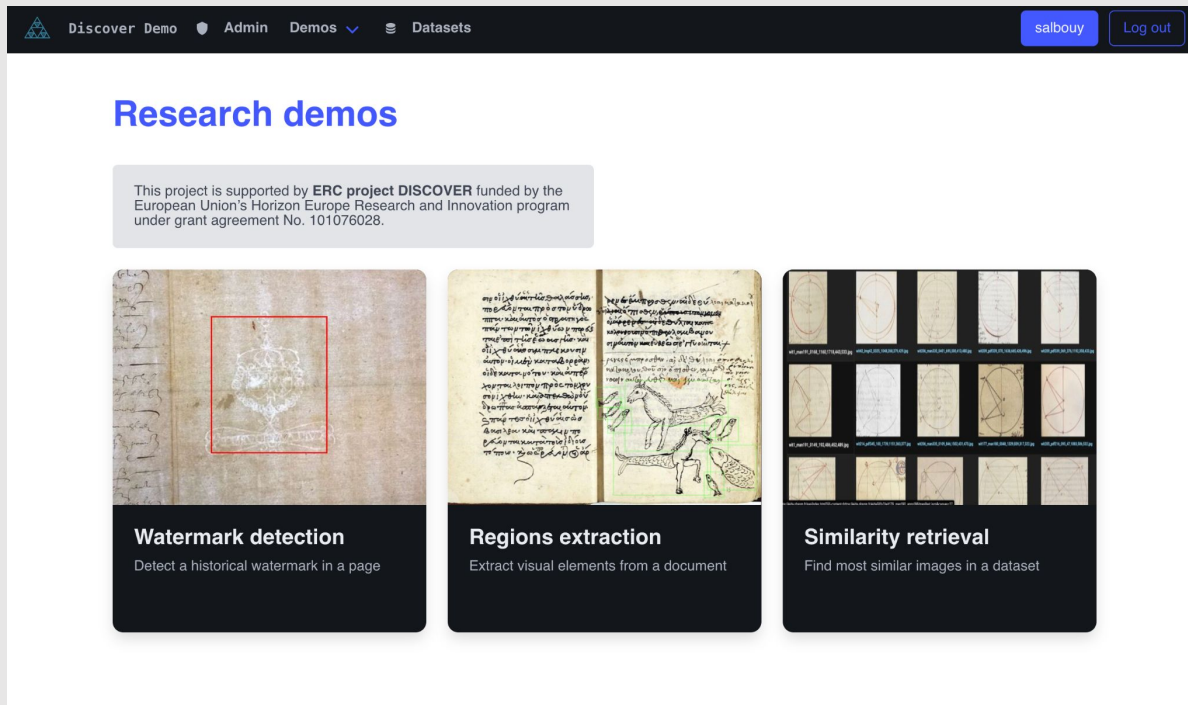
2 plateformes

Toutes deux encore en développement !



<https://discover-demo.enpc.fr/>

<https://aikon-platform.github.io/>

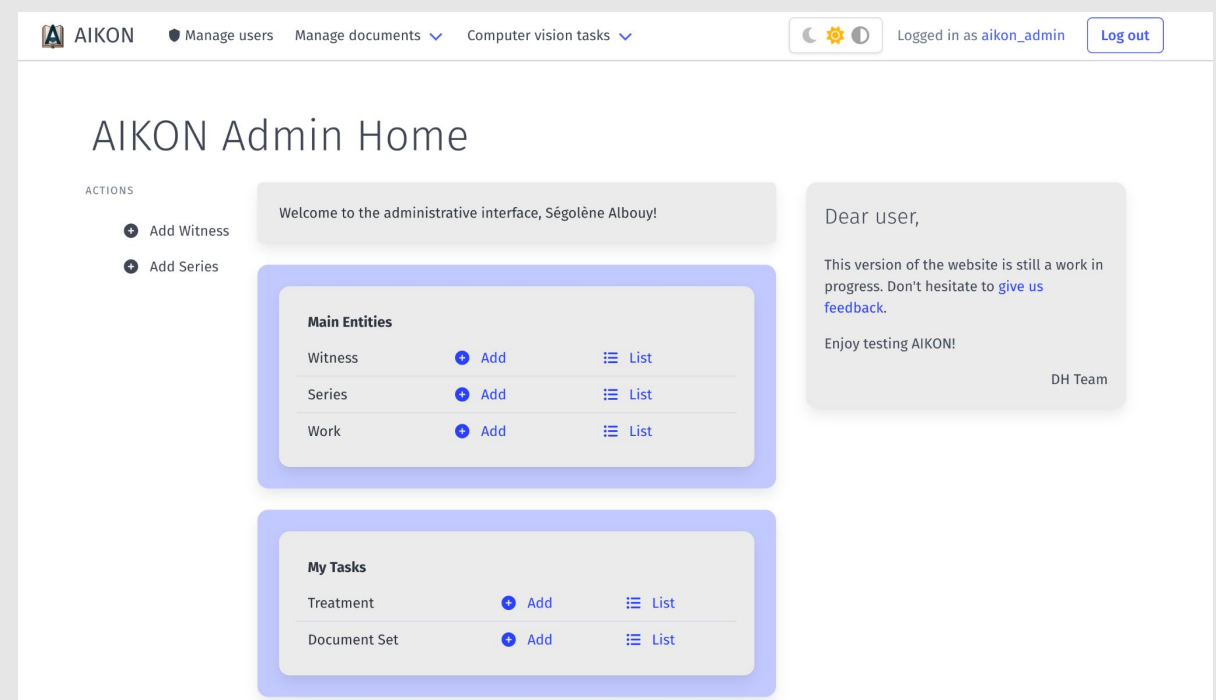


Discover Demo Admin Demos Datasets salbouy Log out

Research demos

This project is supported by ERC project DISCOVER funded by the European Union's Horizon Europe Research and Innovation program under grant agreement No. 101076028.

- Watermark detection**
Detect a historical watermark in a page
- Regions extraction**
Extract visual elements from a document
- Similarity retrieval**
Find most similar images in a dataset



AIKON Manage users Manage documents Computer vision tasks Logged in as aikon_admin Log out

AIKON Admin Home

ACTIONS

- ➕ Add Witness
- ➕ Add Series

Welcome to the administrative interface, Ségolène Albouy!

Dear user,
This version of the website is still a work in progress. Don't hesitate to [give us feedback](#).
Enjoy testing AIKON!
DH Team

Main Entities

Witness	➕ Add	☰ List
Series	➕ Add	☰ List
Work	➕ Add	☰ List

My Tasks

Treatment	➕ Add	☰ List
Document Set	➕ Add	☰ List



2 plateformes

Toutes deux encore en développement !



<https://discover-demo.enpc.fr/>

<https://aikon-platform.github.io/>



Discover Demo Admin Demos Datasets salbouy Log out

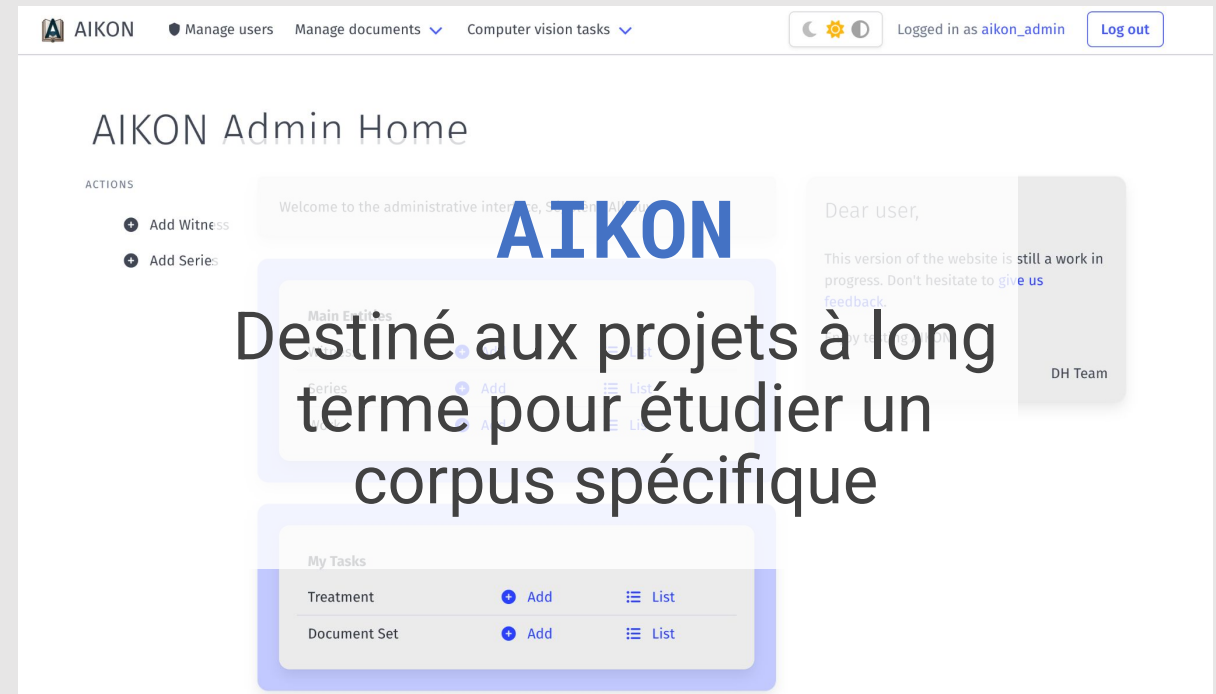
Research demos

This project is supported by ERC project DISCOVER funded by the European Union's Horizon Europe Research and Innovation program under grant agreement No. 101076025

AIKON-demo

Pour tester des algorithmes et télécharger les résultats

- Watermark detection**
Detect a historical watermark in a page
- Regions extraction**
Extract visual elements from a document
- Similarity retrieval**
Find most similar images in a dataset



AIKON Manage users Manage documents Computer vision tasks Logged in as aikon_admin Log out

AIKON Admin Home

WELCOME TO THE ADMINISTRATIVE INTERFACE OF THE AIKON PLATFORM

Dear user, This version of the website is still a work in progress. Don't hesitate to give us feedback.

DH Team

AIKON

Destiné aux projets à long terme pour étudier un corpus spécifique

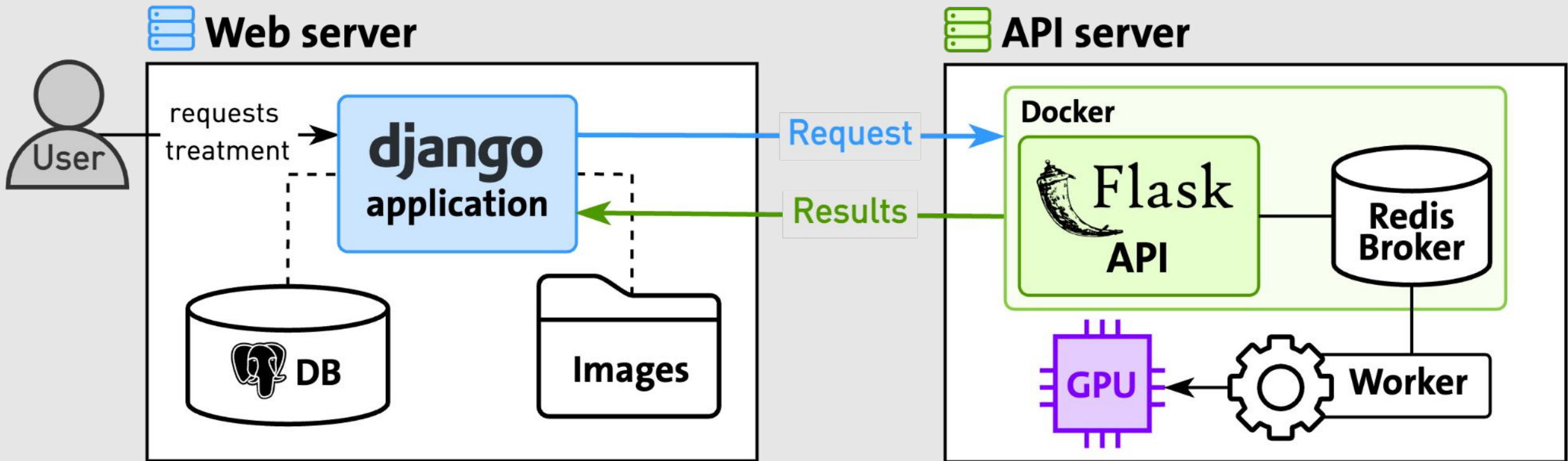
ACTIONS

- Add Witness
- Add Series

My Tasks

Treatment	+ Add	≡ List
Document Set	+ Add	≡ List

Core architecture





Discover Demo



Admin

Demos ▾



Datasets

salbouy

Log out

Research demos

This project is supported by **ERC project DISCOVER** funded by the European Union's Horizon Europe Research and Innovation program under grant agreement No. 101076028.



Watermark detection

Detect a historical watermark in a page



Regions extraction

Extract visual elements from a document



Similarity retrieval

Find most similar images in a dataset

<https://discover-demo.enpc.fr/>



Sign in

Username

Password

Sign in

Don't have an account? [Sign up](#)

Forgot password? [Reset password](#)

Création de compte sans restriction

Tester de préférence sur des datasets <100 images pour tenir compte des ressources en calcul limitées



À venir sur AIKON-demo

- **Clustering**
Intégration d'algorithme de clustering basé sur le prototypage
- **Dataset**
Meilleure gestion des corpus d'images
- **Modèles**
Intégration de davantage de modèles spécifiques
- ... *Arrivée d'un nouvel ingénieur*




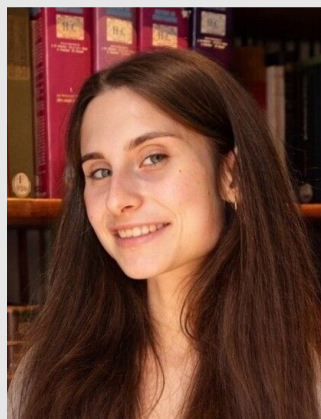
AIKON


<https://aikon-platform.github.io/>

Plateforme née de la collaboration de VHS, EIDA & DISCOVER



 Fouad Aouinti



 Jade Norindr & Clara Grometto



Robin Champenois



Ségolène Albouy

Et beaucoup
d'autres ...



Computer Vision and Historical analysis of Scientific illustration

Corpus d'histoire naturelle, de pharmacologie et mathématique



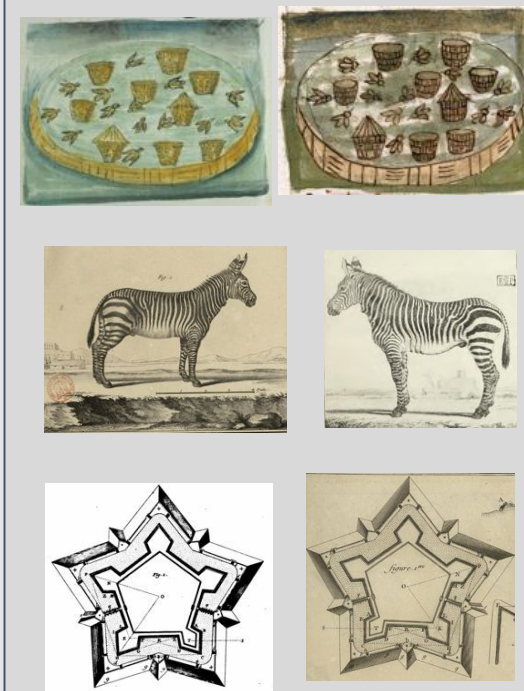
Moyen-Âge
Période moderne

Extraction des illustrations



~405k pages
~235k illustrations

Étude de la circulation des illustrations scientifiques à travers le temps



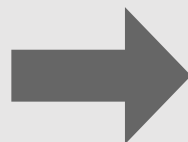


Ε EIDA anr® Editing and analysing historical astronomical Diagrams with AI

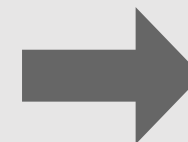
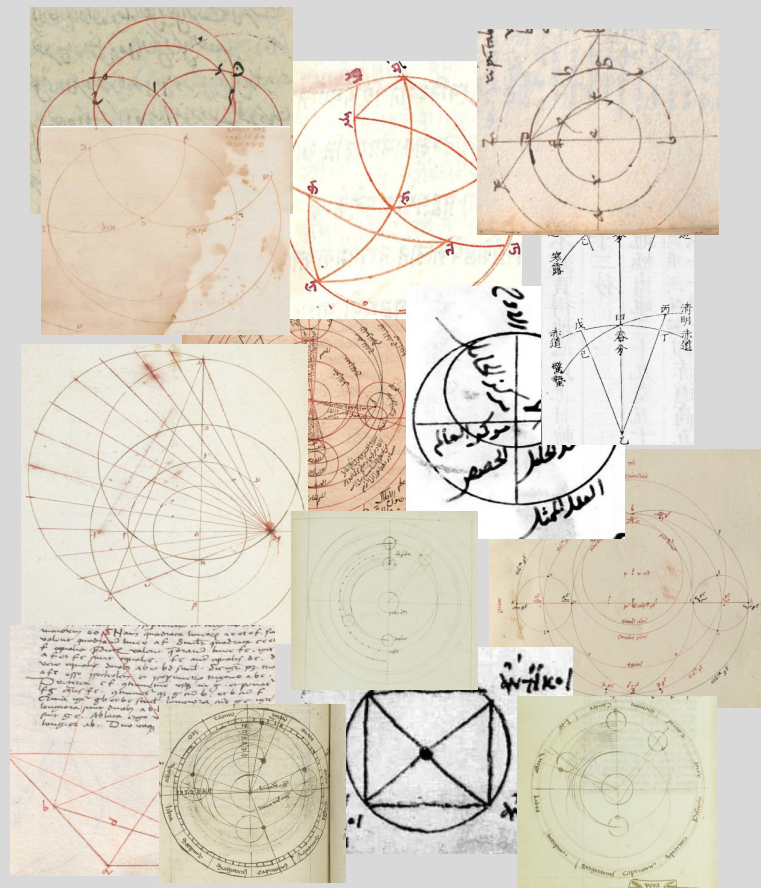
Corpus de tradition ptoléméenne



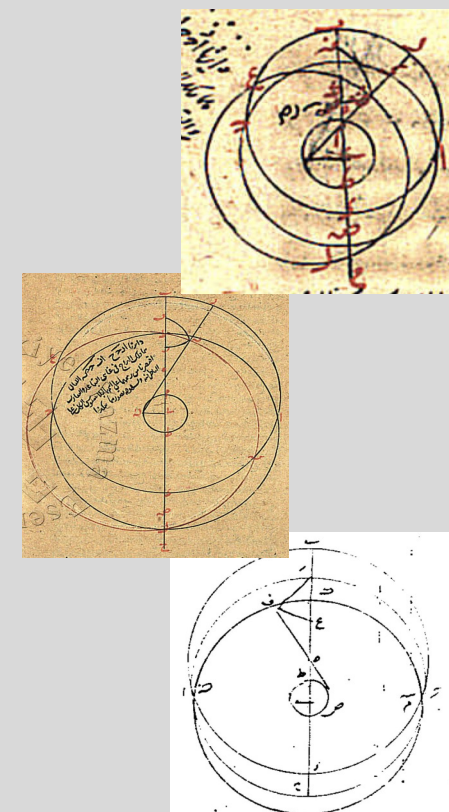
IXe-XIXe
Latin, Hebreu, Sanskrit,
Byzantin, Perse, Grec,
Chinois, Arabe



Extraction des diagrammes



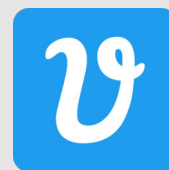
Édition critique de diagrammes





Objectifs communs

Retracer les liens entre représentations visuelles pour étudier la diffusion des images scientifiques et astronomiques



VHS



EIDA

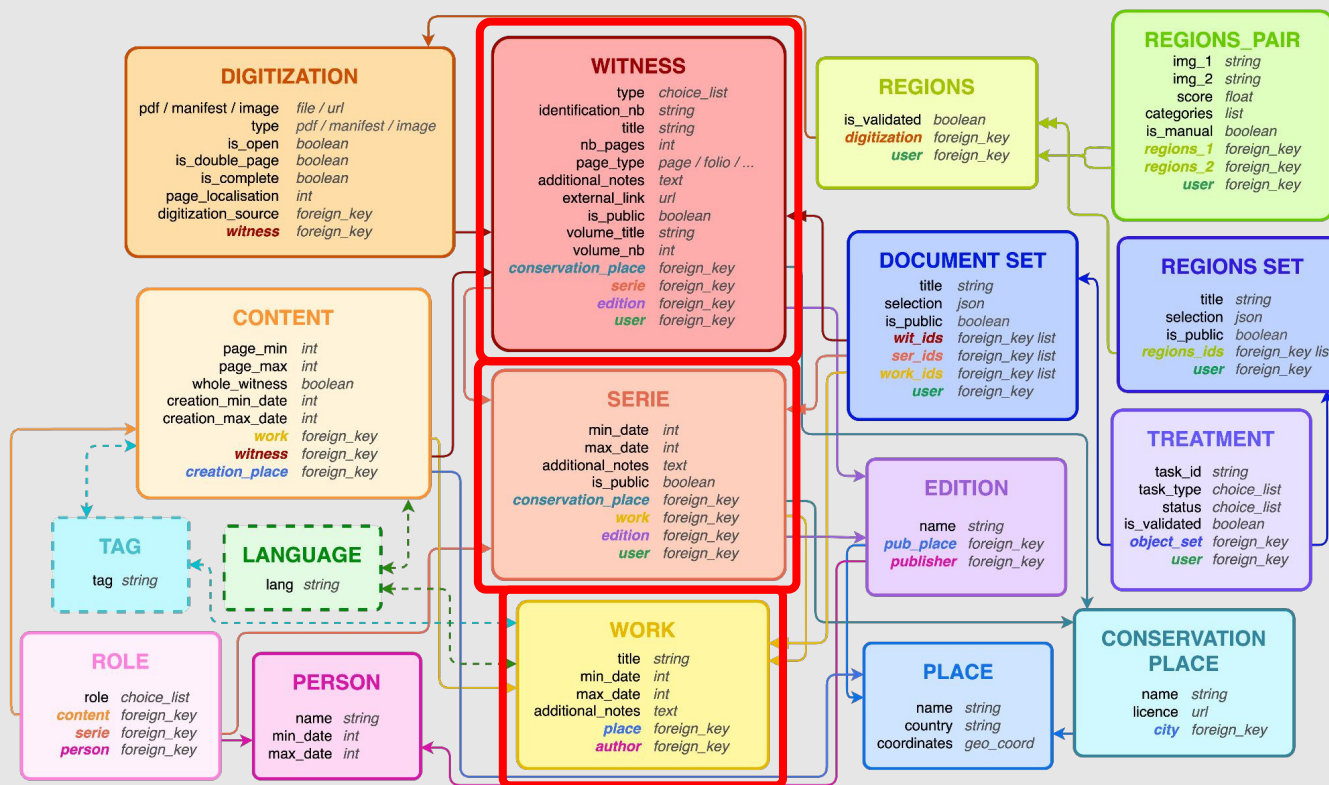
Large corpus hétérogènes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Extraire des régions d'images	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Retrouver des copies	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Créer des éditions de ces copies		<input checked="" type="checkbox"/>



Management de sources historiques

Décrire les documents historiques

Modèle de données conçu pour l'étude des liens intellectuels entre les sources



The screenshot shows the 'Add Witness' form in the AIKON application. The form includes the following fields and options:

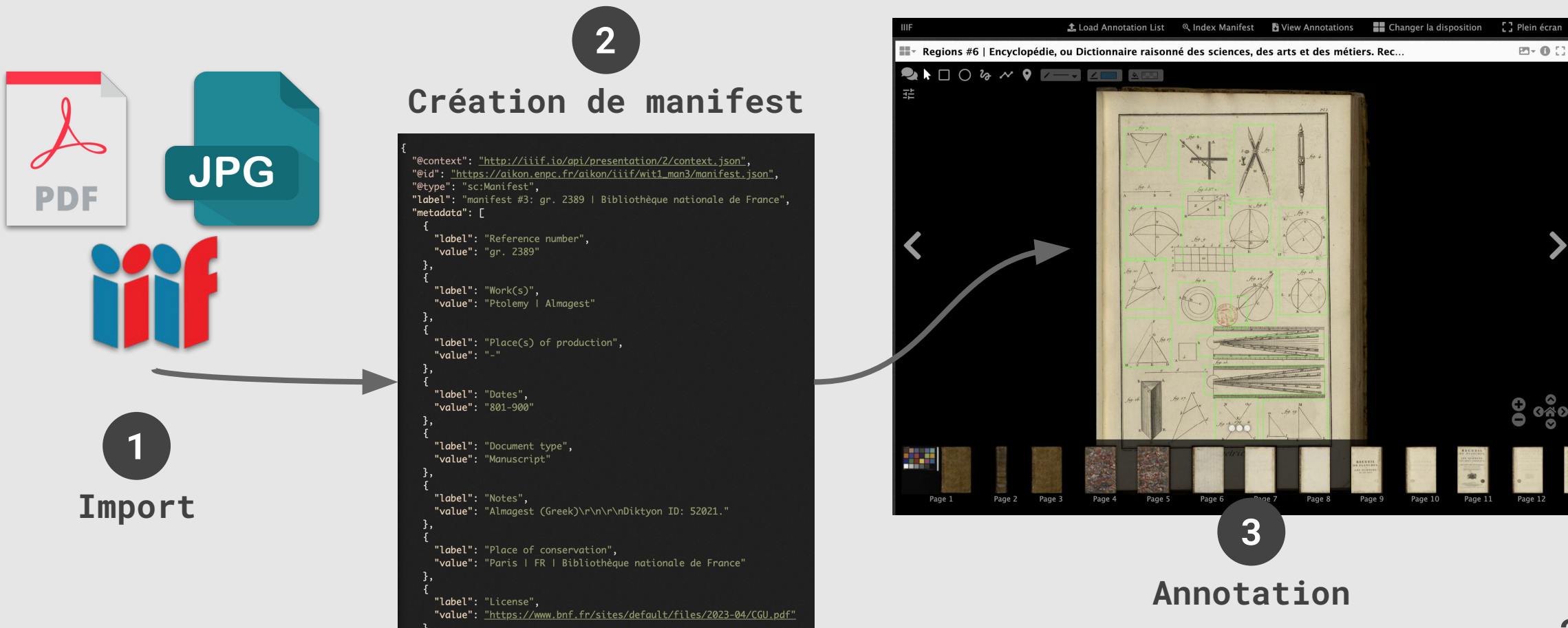
- Witness identification**: Type (dropdown), Identification number (text input), Conservation place (dropdown).
- Pagination type**: Page (dropdown), Number of pages/folios (text input).
- Additional notes**: Text area.
- External link (online catalog, etc.)**: Text input.
- Make it public**: Checkbox.
- Digitizations**: Digitization: #1 (dropdown).
- Type**: (dropdown).



Management de sources historiques

Gestion des numérisations

Environnement complet pour importer, visualiser et annoter des scans





Management de sources historiques

Sélection de documents

Création de corpus cohérents pour des traitements groupés

AIKON Manage users Manage documents Computer vision tasks Logged in as salbouy Log out

- Witness #1 gr. 2389 | Bibliothèque nationale de France** Public
aikon_admin 2024-09-17 09:53
Work: Ptolemy | Almagest | Dates: 801-900 | Language: Ancient greek | Page number: 376 ff. | Identification number: gr. 2389
- Witness #2 III C 19 | Biblioteca nazionale** Public
aikon_admin 2024-09-19 19:56
Work: Ptolemy | Almagest | Dates: - | Language: Ancient greek | Page number: 246 ff. | Identification number: III C 19
- Witness #3 hebr. Or. fol. 1054 | Staatsbibliothek** Public
aikon_admin 2024-09-19 19:55
Work: Ptolemy | Almagest | Dates: - | Language: Hebrew | Page number: 180 pp. | Identification number: hebr. Or. fol. 1054
- Witness #4 RARES 091 P95A | State Library of Victoria** Public

Almagest #1 (4)

Witness

- #1 gr. 2389 | Bibliothèque nationale de France
- #2 III C 19 | Biblioteca nazionale
- #3 hebr. Or. fol. 1054 | Staatsbibliothek
- #4 RARES 091 P95A | State Library of Victoria

Clear selection Save selection

Document set #1 Almagest #1 (4 documents)

aikon_admin 2024-10-01 14:34

vectorization #11500b3c-05e5-4ab5-a948-89886e9e16d9 regions #84181fdc-05d0-4754-8717-bd9c0d09cf3e similarity #c365fa17-05e1-4cdd-bfe7-1cdf7d9f49da

- Witness #1 gr. 2389 | Bibliothèque nationale de France
- Witness #2 III C 19 | Biblioteca nazionale
- Witness #3 hebr. Or. fol. 1054 | Staatsbibliothek
- Witness #4 RARES 091 P95A | State Library of Victoria

Unload from selection



Traitement automatique des sources

Gestion des requêtes d'inférences

Interface permettant aux utilisateurs de lancer des traitements

1
Sélection

Almagest #1 (4)

Witness

- #1 gr. 2389 | Bibliothèque nationale de France
- #2 III C 19 | Biblioteca nazionale
- #3 hebr. Or. fol. 1054 | Staatsbibliothek
- #4 RARES 091 P95A | State Library of Victoria

Clear selection Go to treatment

Add new treatment

Task type
Image regions extraction

Document set
Almagest #1

Notify by email
Send an email when the task is finished

Submit

2
Treatment form

Treatment #8f50067e-a0da-4bc0-a350-8b9ba90aadda Regions | Physiologus #5 Cancel treatment IN PROGRESS

mathieu 2024-09-28 16:18

Witness #7 Gr. IV. 35 | Biblioteca Nazionale Marciana Witness #9 Ott. Gr. 354 | Biblioteca Apostolica Vaticana

Witness #10 Barb. Gr. 438 | Biblioteca Apostolica Vaticana

Treatment #8af0bffc-bd89-4047-b29e-428c784c6959 Regions | Encyclopédie, Paris et Livourne #4 SUCCESS

mathieu 2024-09-28 15:56

Witness #5 Encyclopédie, ou Dictionnaire raisonné des sciences, des arts et des métiers. Recueil de planches, sur les sciences, les arts libéraux, et les arts mécaniques, avec leur explication, Vol. 5 Witness #6 Encyclopédie, ou Dictionnaire raisonné des sciences, des arts et des métiers. Troisième édition enrichie de plusieurs notes [édition de Livourne], Vol. 5

3
Task monitoring



Traitement automatique des sources

Visualisation et correction des résultats

Modes d'affichage pour permettre la manipulation des résultats automatique

“Encyclopédie, ou Dictionnaire raisonné des sciences, des arts et des métiers. Recueil de planches, sur les sciences, les arts libéraux, et les arts mécaniques, avec leur explication, Vol. 5” regions

Regions #0

✓ Validate ✓ Select all Download

Reload Go to editor Delete selected regions

All regions Per page Similarity Vectorization

Selection (12)

“Ott. Gr. 354 | Biblioteca Apostolica Vaticana” regions

Regions #10

All regions Per page Similarity Vectorization

current Regions #10 | Ott. Gr. 354 | Biblioteca Apostolica Vaticana Regions #12 | Gr. IV. 35 | Biblioteca Nazionale Marciana Regions #11 | Barb. Gr. 438 | Biblioteca Apostolica Vaticana

1 2 3

1 - 25 / 51

Page 1

Add new match + -

Page 2

“gr. 2389 | Bibliothèque nationale de France” regions

Regions #9

All regions Per page Similarity Vectorization

1 2

1 - 49 / 66

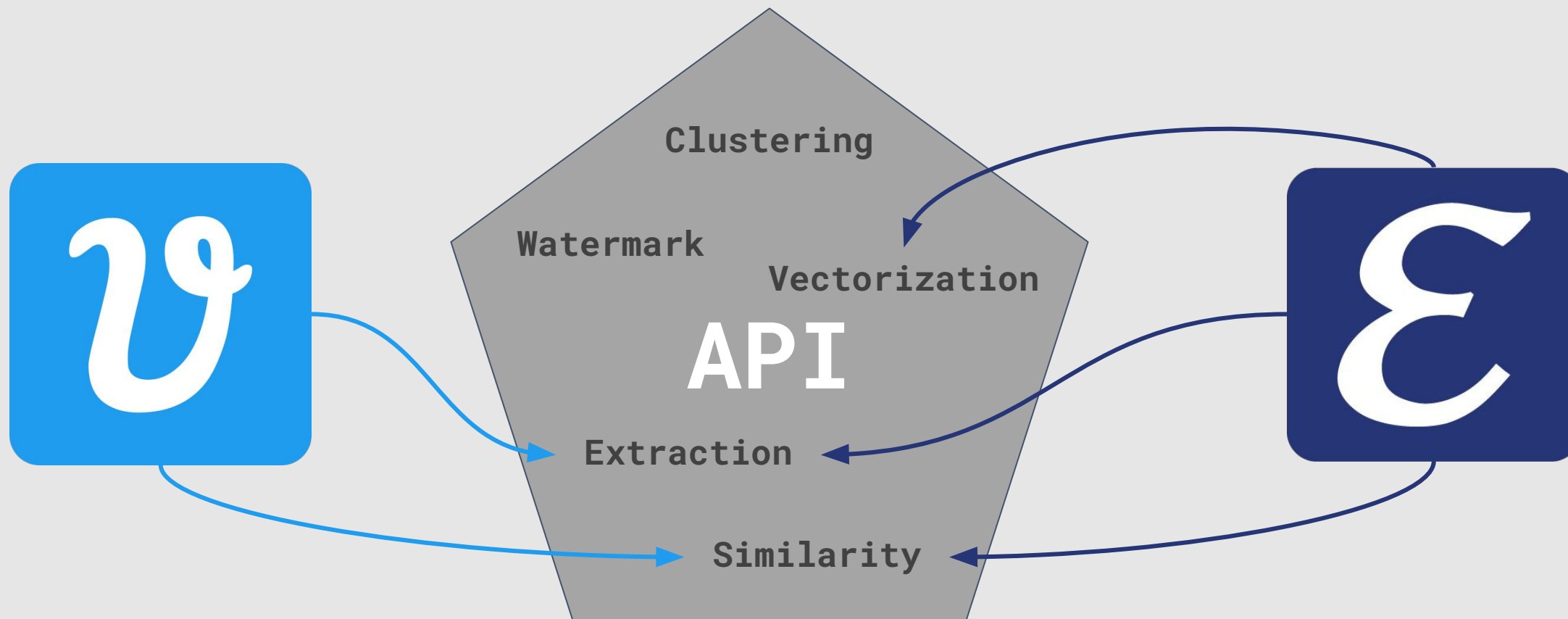
Select



Traitement automatique des sources

Choix des traitements de vision artificielle

Possibilité d'activer/ajouter des modules en fonction des besoins





Log in

To connect as a guest, use the following credentials:

- Username: **guest**
- Password: **Aikon_2024**

Username

Password

[Forgotten password?](#)

Login

aikon.enpc.fr



À venir sur AIKON

- **Interface**

Multiples améliorations des interfaces

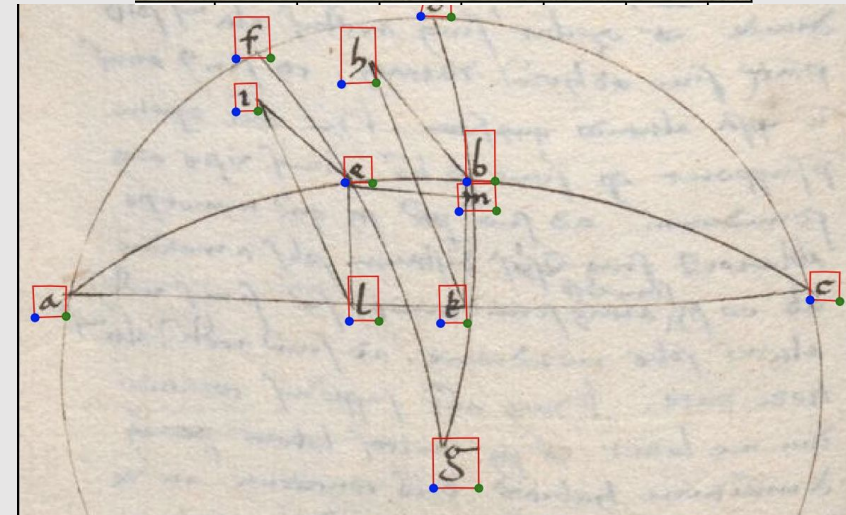
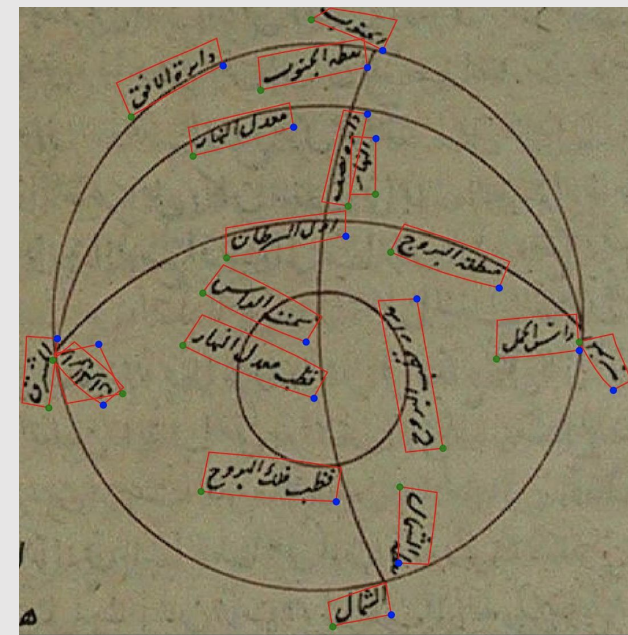
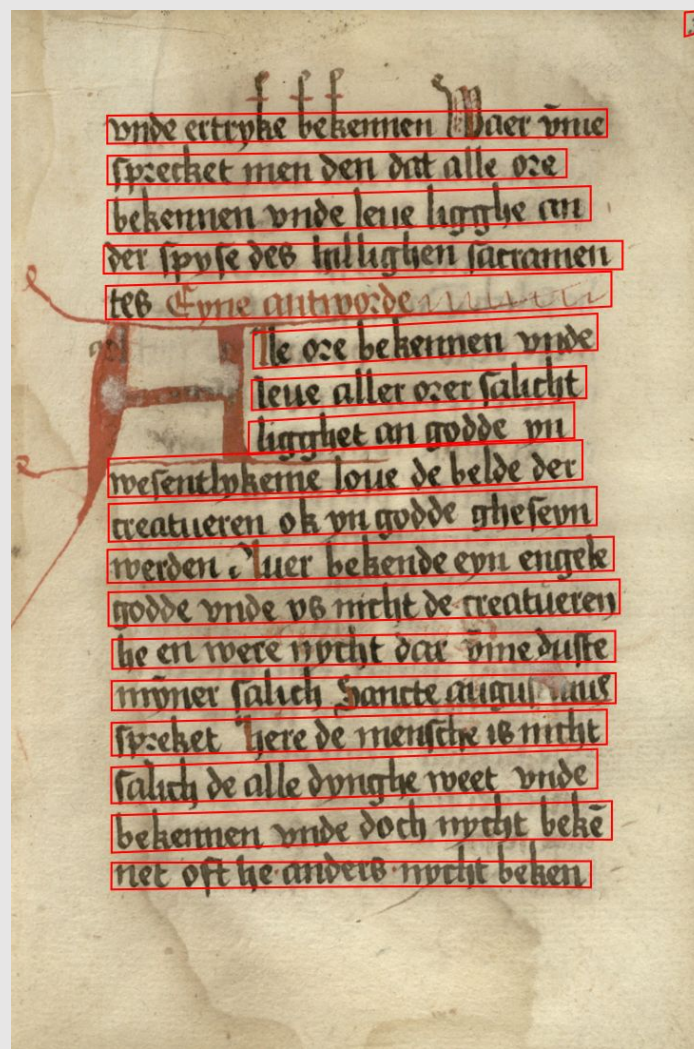
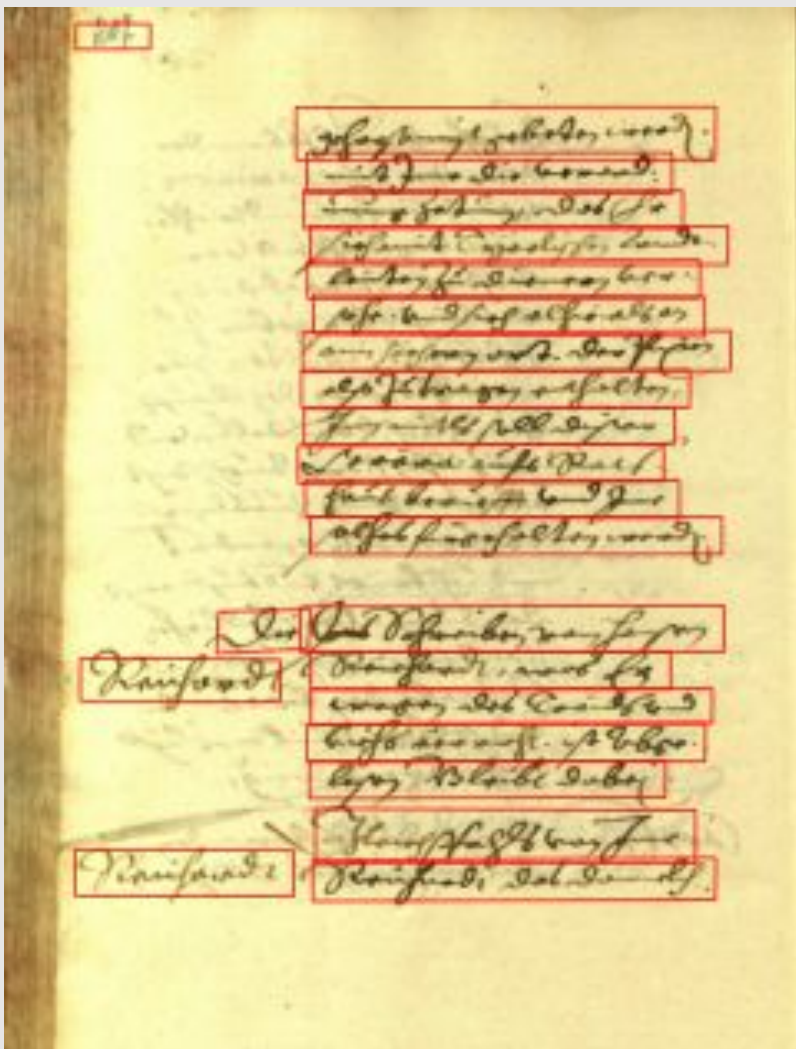
- **Export**

Plus de formats pour récupérer les résultats bruts

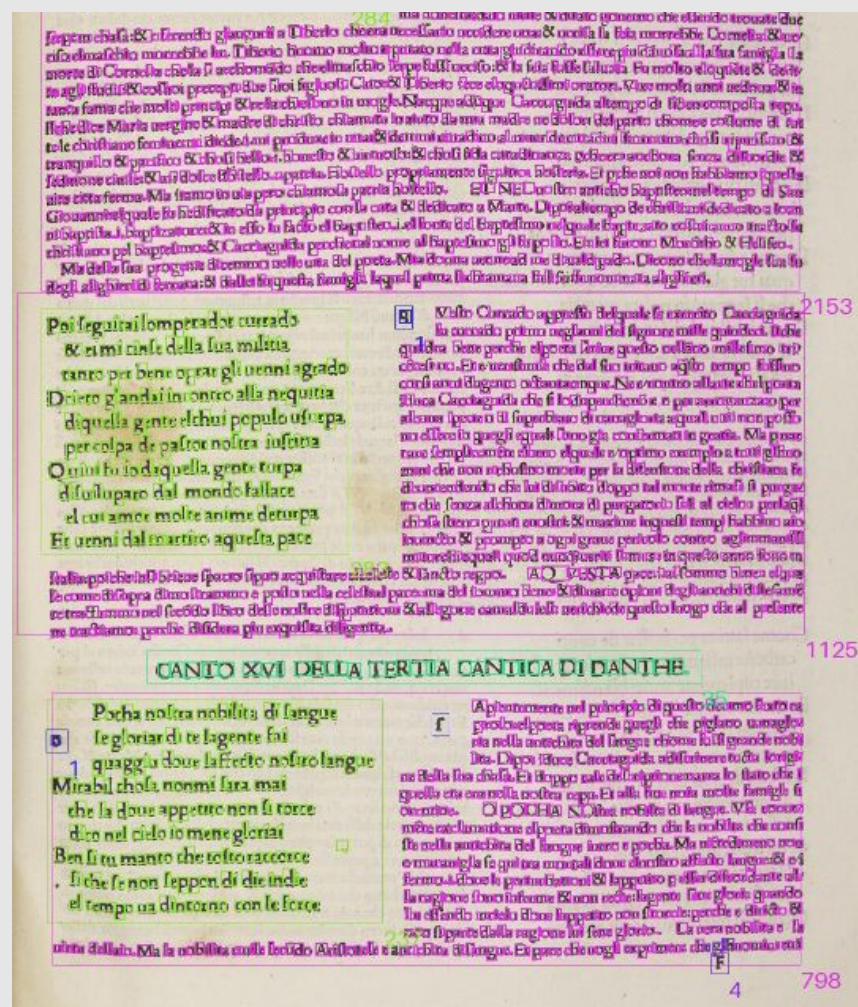
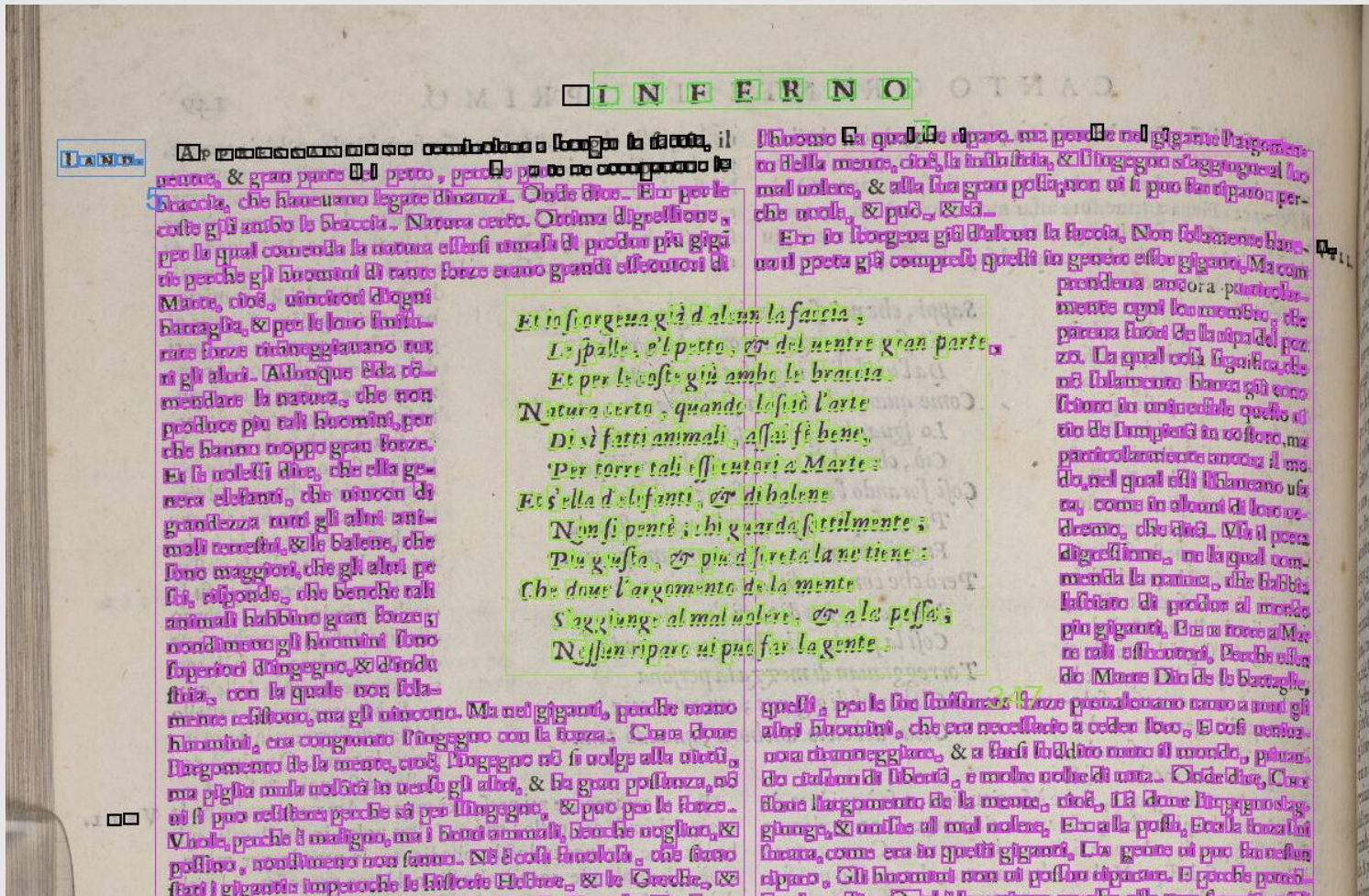
- **Modules**

Intégration prochaine de la détection de ligne, travail sur l'OCR et sur la segmentation de mise en page

Text lines / regions



Characters (and OCR/HTR)



Mise en page

Page 10 THE DAILY MIRROR May 21, 1910

WISE WORDS TO THE OVER-STOUT.

Gentle exercise is good for all of us, violent exercise not so. For most persons, gymnastic exercises are particularly bad, as from extremely bad action. The vital organs are, with very few exceptions, empty organs and will not stand a violent exercise with a full result.

On the other hand, many over-stout persons are able to get the greatest exercise that would do them much good. Their occupation and their habits may be "chilled, earthed, cooled," if they will, and they will enjoy a little recreation in the open air. They are dead in a bad way, and ought to be wakened up.

It is not the exercise that is the trouble, but the manner of it. It is not the exercise that is the trouble, but the manner of it. It is not the exercise that is the trouble, but the manner of it.

TRIALS OF THE FLESH. BURDEN OF OBESITY REMOVED.

Thousands have done it. Tens of thousands of all degrees of overweight, from the slightly too plump to the enormously fat, possess the same ailment, and the same remedy. The remedy is simple, and the cure is complete. The cure is simple, and the cure is complete. The cure is simple, and the cure is complete.

A YORKSHIRE LADY'S GRATITUDE.

My dear friend, I am glad to hear that you are well. I am glad to hear that you are well. I am glad to hear that you are well. I am glad to hear that you are well.

STRAINING LETTER FROM AN ERMENT FRENCH FRENCH.

I am glad to hear that you are well. I am glad to hear that you are well. I am glad to hear that you are well. I am glad to hear that you are well.

BEAUTY'S ENEMY AND FRIEND.

There is a secret to a fair and elegant woman. There is a secret to a fair and elegant woman. There is a secret to a fair and elegant woman.

LESLIE'S ILLUSTRATED WEEKLY NEWSPAPER, NOVEMBER 4, 1913

A Good Bookcase for the price of a good book!

Leslie's ILLUSTRATED WEEKLY NEWSPAPER

THE OLDEST ILLUSTRATED WEEKLY NEWSPAPER IN THE UNITED STATES

EDITED BY JOHN A. SLEICHER

"In God We Trust"

CXVII Thursday, November 6, 1913 No. 3035

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fundstrom SECTIONAL BOOKCASE

Let Leslie's Motor Department Help You

If you drive a motor car, ride a motor cycle, or run a motor boat, the Motor Department can help you to solve some of the problems of operation, routes or equipment that may arise.

LESLEI'S ILLUSTRATED WEEKLY NEWSPAPER, NOVEMBER 4, 1913

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APRIL 14, 1900 BLACK AND WHITE BUDGET 41

Col. Paulman, Diamond Fields House. A defender of Kimberley

Lieut.-Col. T. E. Stephenson, Essex Regt.—Commanding 18th Brigade

Col. M. C. Curry, Devon Regt.—Governor of Ladysmith

The Duke of Norfolk has made no small sacrifices in responding so loyally to their country's call for volunteers to carry out his patriotic intention of going to the front on the staff of the Sussex contingent of the Imperial Yeomanry; and countless were the good wishes of which he was the recipient on his departure from Southampton by the *Carrisbrook Castle* on Saturday afternoon, March 31st. On leaving Arundel in the morning he was the object of a most enthusiastic demonstration, though, in accordance with his Grace's wish, there was no procession. At the railway station addresses were read from the Mayor, Aldermen, and burgesses of Arundel, the Urban Council of Littlehampton, and the Duke's farm tenants in Sussex and Surrey, expressing admiration at the voluntary sacrifice he was making in his patriotic endeavour to emulate the deeds of his illustrious ancestors. In reply to these, his Grace, Financial Secretary to the Treasury since 1895, continues modestly remarked that while the men of Sussex were to represent the Post Office in the House of Commons.

Without doubt his Grace is the most influential Roman Catholic in the kingdom. He is also Earl Marshal, and Hereditary Marshal and Chief Butler of England, and Premier Duke and Earl. He is the fifth Duke of Norfolk, and since 1864 has been Hon. Colonel of the 4th West Riding Yorkshire Volunteers, while he has been Lieut.-Colonel of the 2nd Battalion of the Royal Sussex Regiment since 1891. For the past five years he was Postmaster-General, but he lately resigned the office in order to go to South Africa. He is succeeded by the Marquess of Londonderry. Mr. Hanbury, who has been modestly remarked that while the men of Sussex were to represent the Post Office in the House of Commons.

Surg.-Maj. (Retd.)—R.A.M.C.—Chief Surgeon, I.V. Field Hospital

Capt. W. L. P. Gilbert, Royal Army Medical Corps—Lieut. Colonel, I.V. Field Hospital

Mr. Emory Evans, Financial Adviser to Lord Roberts

SOME OF THE NATION'S SERVANTS

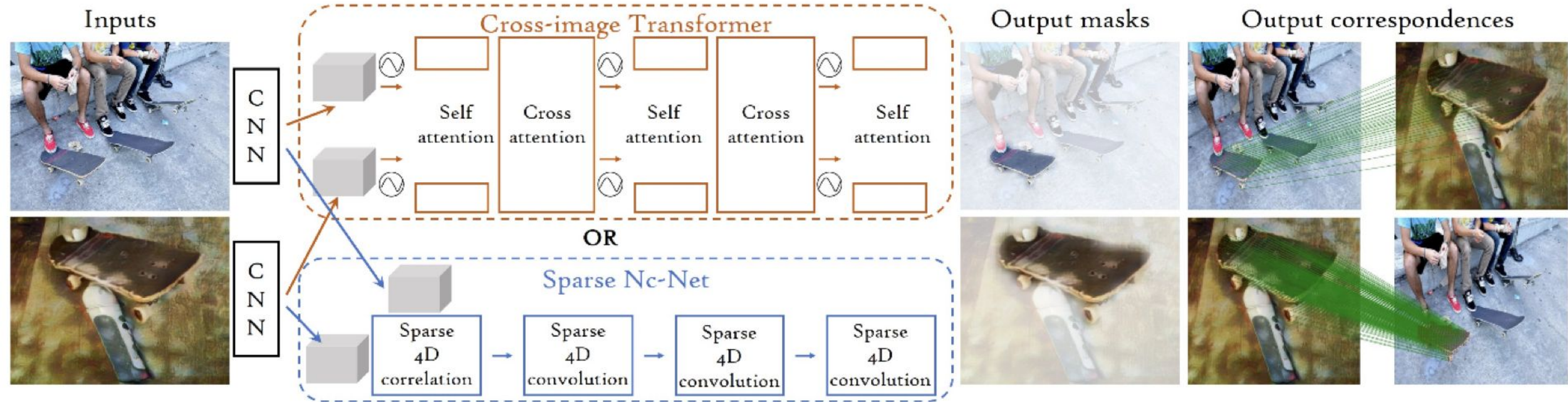


AIKON

<https://aikon-platform.github.io/>

- ✓ Open-source (plateforme + models)
- ✓ Modulaire
- ✓ Conçu pour
 - Décrire les sources historiques
 - Analyser les corpus visuels
 - Accélérer le travail des chercheurs
- ✓ *Initial release* inclut :
 - illustration extraction
 - similarity search
 - vectorization

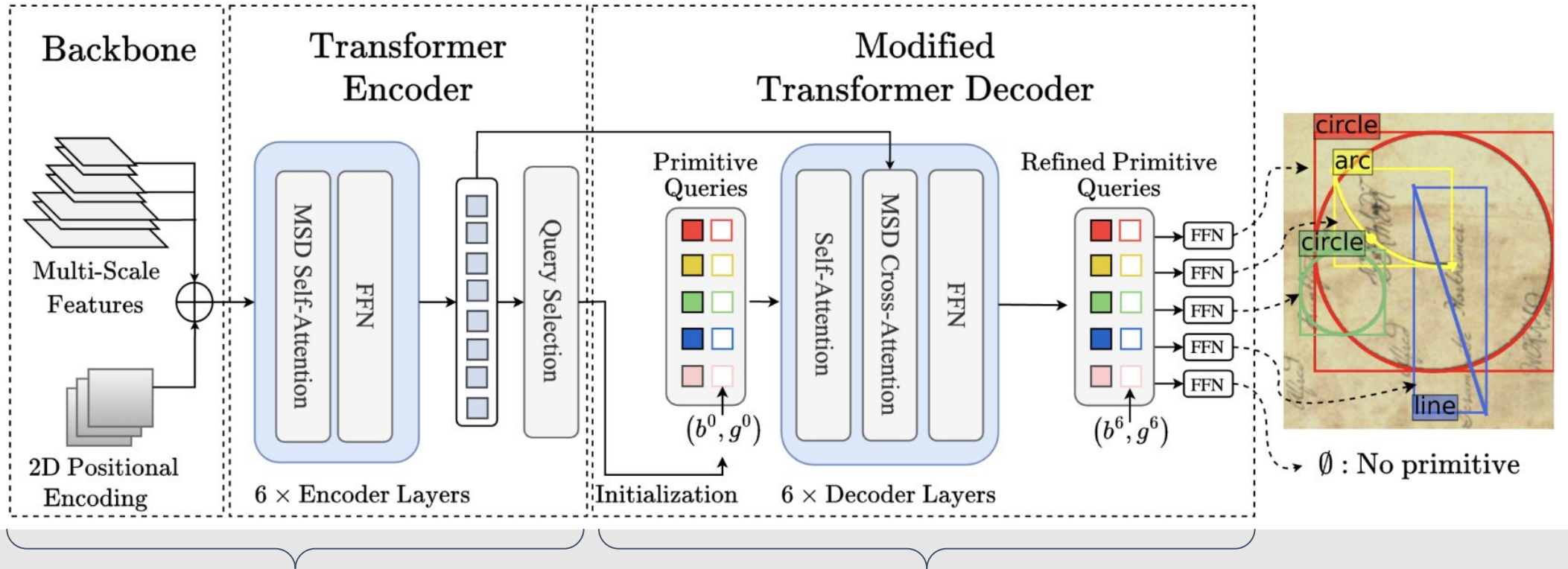
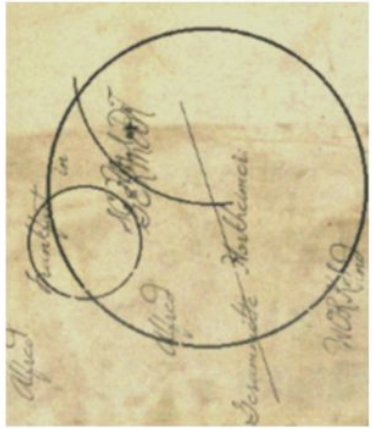




Learning Co-segmentation by Segment Swapping for Retrieval and Discovery

X. Shen, A. Efros, A. Joulin, M. Aubry, *CVPR 2022 workshops*





Encodage des images en features

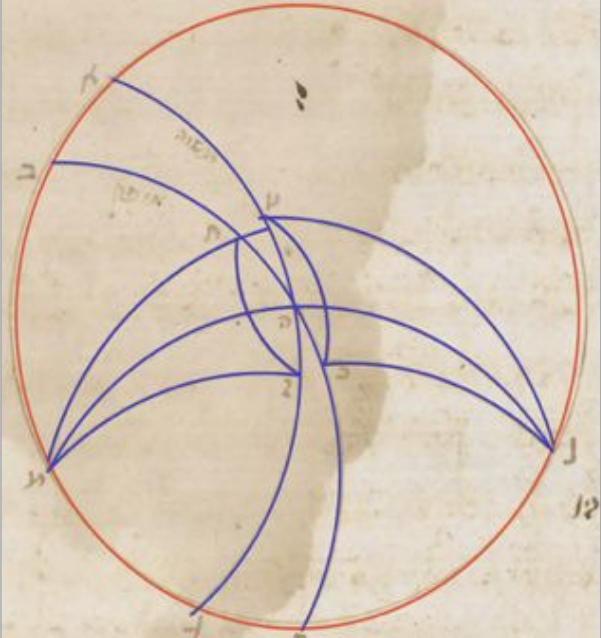
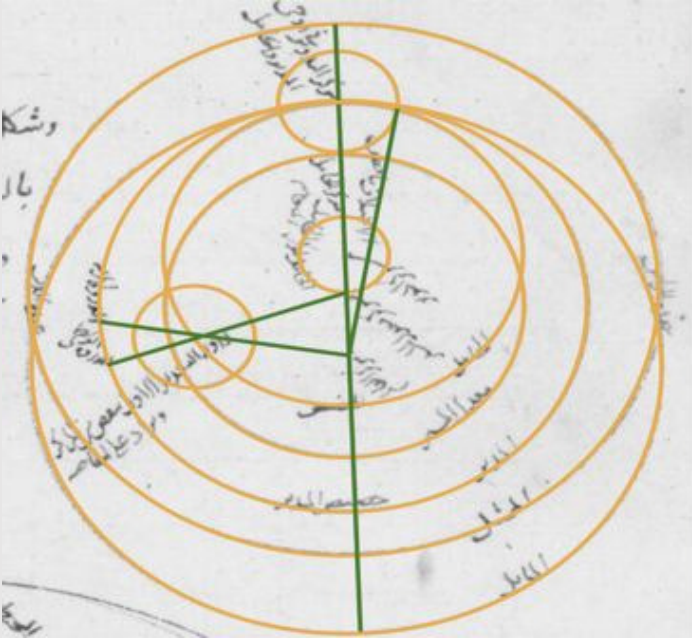
Décodage des features en primitives

Historical Astronomical Diagrams Decomposition in Geometric Primitives

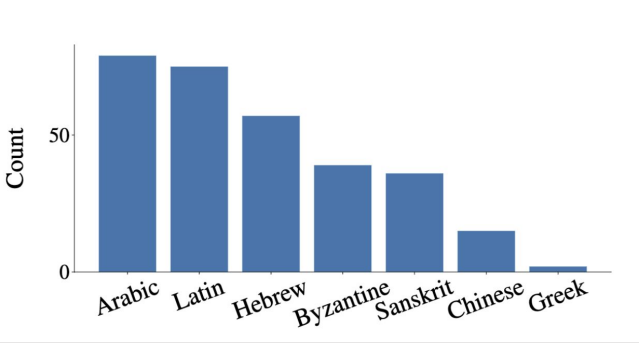
S. Kalleli, S. Trigg, S. Albouy, M. Husson, M Aubry ICDAR 2024



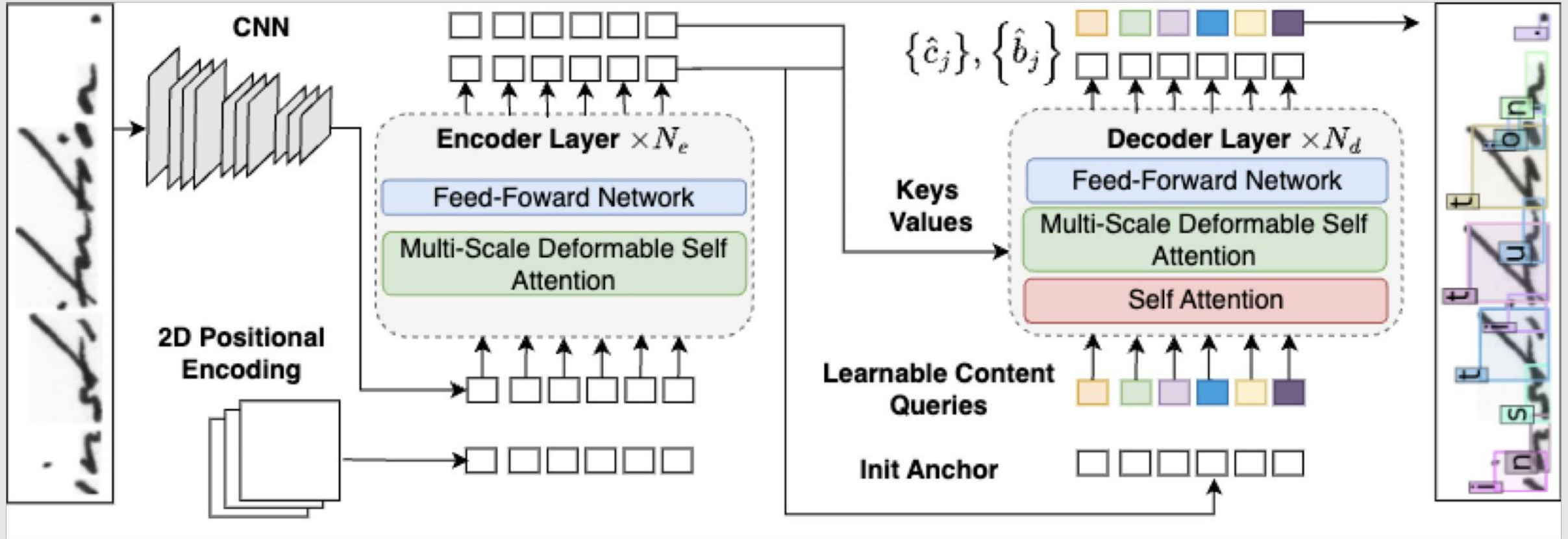
Corpus de test annoté par des experts



Historical Astronomical Diagrams Decomposition in Geometric Primitives
S. Kalleli, S. Trigg, S. Albouy, M. Husson, M Aubry ICDAR 2024



Données synthétiques pour OCR/HTR



General Detection-based Text Line Recognition

R. Baena, S. Kalleli, M. Aubry, *NeurIPS 2024*

