

# ICDAR 2021 Competition on Historical Map Segmentation

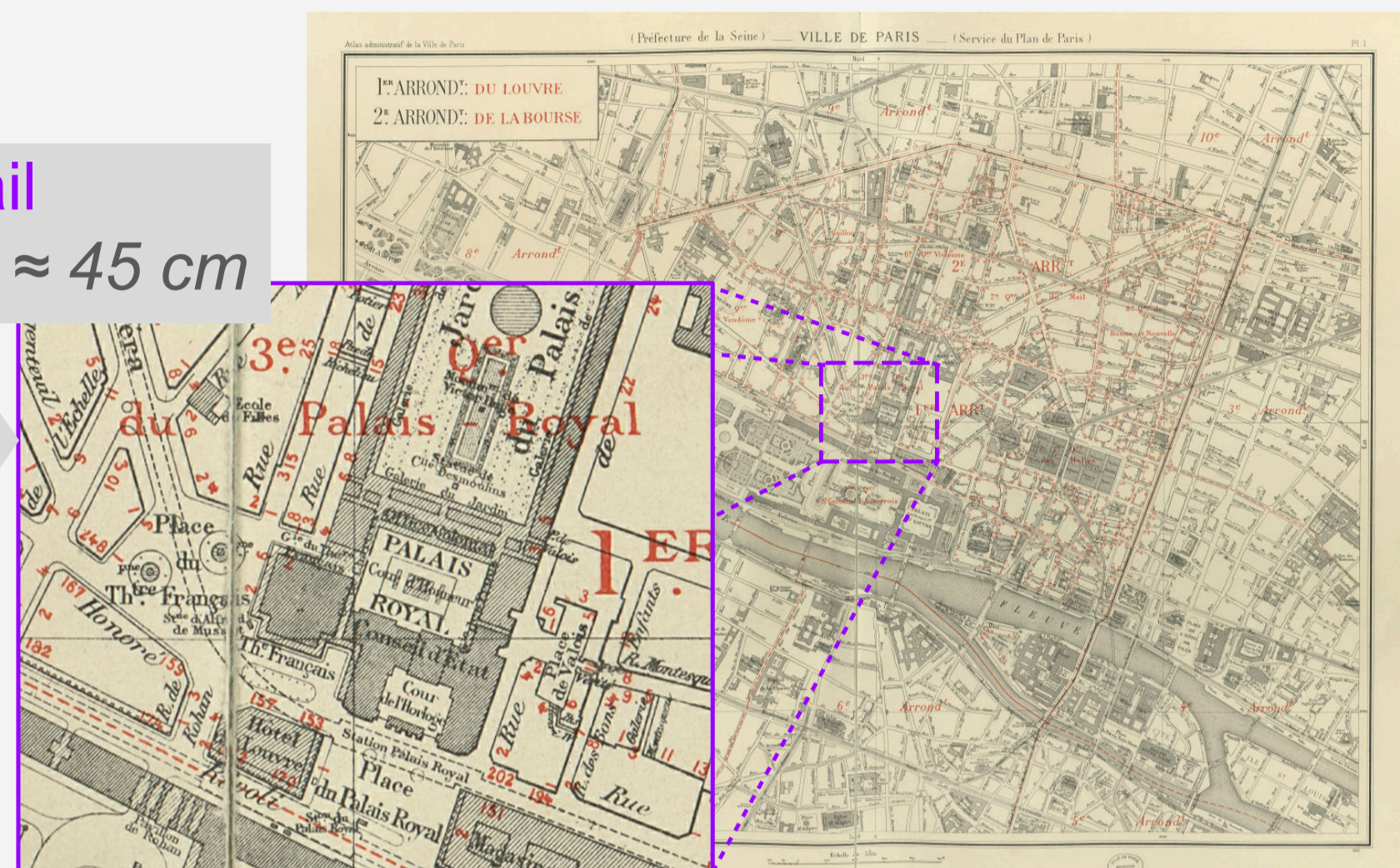
J. Chazalon<sup>1</sup>, E. Carlinet<sup>1</sup>, Y. Chen<sup>1,2</sup>, J. Perret<sup>2,3</sup>, B. Duménieu<sup>3</sup>, C. Mallet<sup>2</sup>, T. Géraud<sup>1</sup>

<sup>1</sup>EPITA Research and Development Lab. (LRDE), EPITA, France, <sup>2</sup>Univ. Gustave Eiffel, IGN-ENSG, LaSTIG, France, <sup>3</sup>LaDéHiS, CRH, EHESS, France

## Sample Sheet (1925)

11136 x 7711 px

Detail  
1 px ≈ 45 cm



## Motivation

Digitize historical atlases from the city of Paris, from 19<sup>th</sup> and early 20<sup>th</sup> centuries, focusing on the **vectorization** process.

## Challenges

**Map-related:** overlappings, mixed contents, ambiguous symbology...

**Document-related:** paper folding and tearing, ink erasure, manual annotations...

## Participants

**CMM Team** — Center for Mathematical Morphology, Mines ParisTech, PSL Research University, France

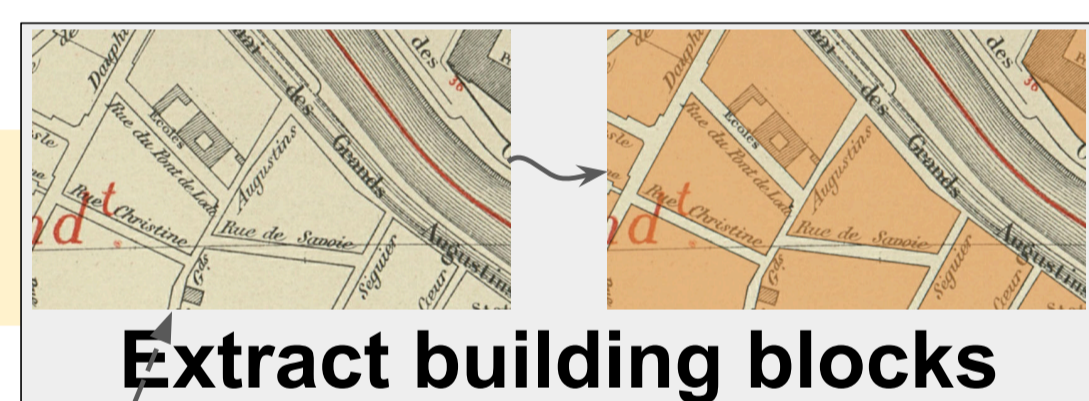
**IRISA Team** — IRISA/Université Rennes 2, Rennes, France

🏆 **L3IRIS Team** — L3i, University of La Rochelle, France; Liris, INSA-Lyon, France

🏆🏆 **UWB Team** — University of West Bohemia, Univerzitiň, Pilsen, Czech Republic

**WWU Team** — Münster University, Germany

## Task 1



Extract building blocks

## Dataset

**Train set:** 1 large image (~8000×8000)  
903 building blocks  
**Validation set:** 1 large image (~8000×8000)  
659 building blocks  
**Test set:** 3 large images (~8000×8000)  
827, 787 and 828 building blocks

## Metric

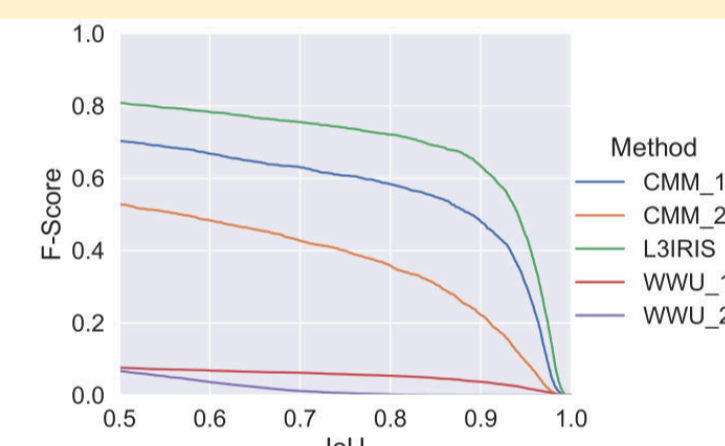
### COCO Panoptic + Extensions

Kirillov, A., He, K., Girshick, R., Rother, C., Dollár, P.: Panoptic segmentation. CVPR 2019

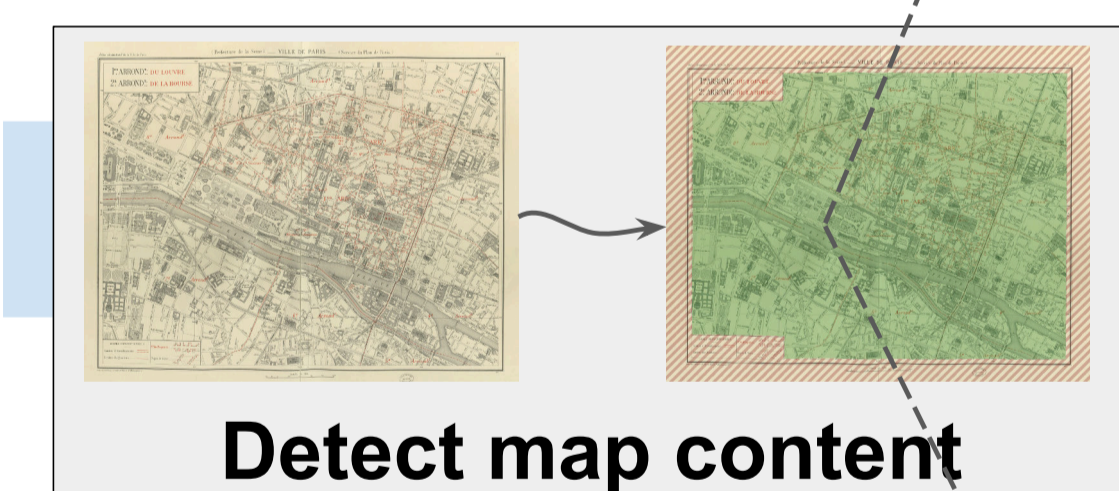
$$PQ = \underbrace{\frac{\sum_{(p,g) \in TP} IoU(p,g)}{|TP|}}_{\text{segmentation quality (SQ)}} \times \underbrace{\frac{|TP|}{|TP| + \frac{1}{2}|FP| + \frac{1}{2}|FN|}}_{\text{recognition quality (RQ)}}$$

## Results

Rank	Team (method)	COCO PQ (%) ↑
1	L3IRIS	74.1
2	CMM (1)	62.6
3	CMM (2)	44.0
4	WWU (1)	06.4
5	WWU (2)	04.2



## Task 2



Detect map content

## Dataset

**Train set:** 26 large images (~10000×10000)  
**Validation set:** 6 large images (~10000×10000)  
**Test set:** 95 large images (~8000×8000)

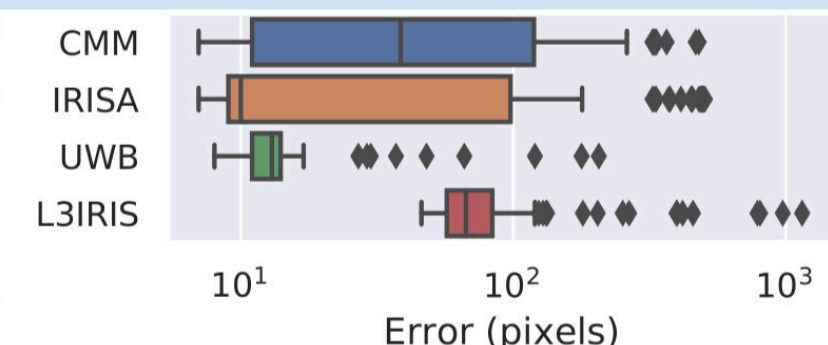
## Metric

### Hausdorff 95

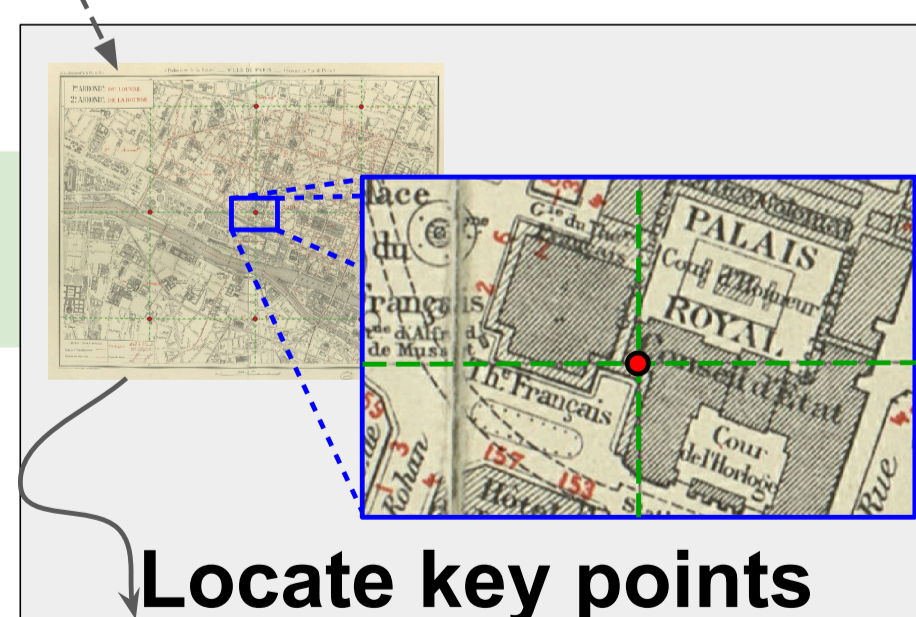
1. Compute Hausdorff distance between target and predicted shape for all points in target boundary
2. Retain the 95th percentile

## Results

Rank	Team	Hausdorff 95 (pix.) ↓
1	UWB	19
2	CMM	85
3	IRISA	112
4	L3IRIS	126



## Task 3



Locate key points

## Dataset

**Train set:** 26 large images (~10000×10000)  
265 intersections to detect  
**Validation set:** 6 large images (~10000×10000)  
84 intersections to detect  
**Test set:** 95 large images (~8000×8000)  
817 intersections to detect

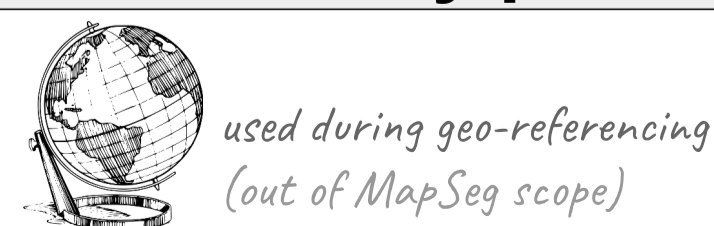
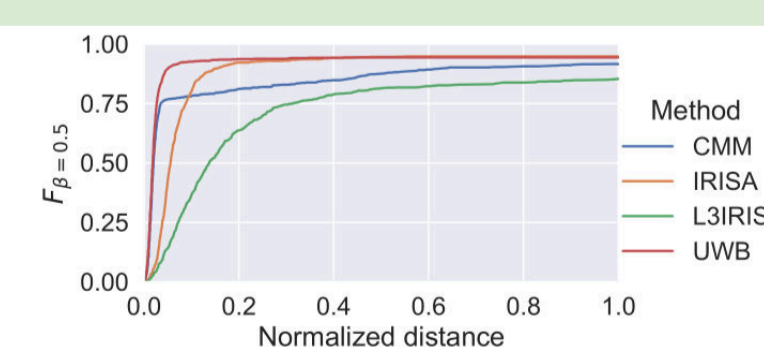
## Metric

### Custom point detection metric

1. Plot detection F-score curve for all distance thresholds between 0 and 50 pixels
2. Report the area under this curve (AUC)

## Results

Rank	Team	Detection score (%) ↑
1	UWB	92.5
2	IRISA	89.2
3	CMM	86.6
4	L3IRIS	73.6



Competition report, Dataset with ground truth, Participants' submissions, Detailed descriptions, Evaluation Report, Evaluation Tools...

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