Semi-automatic Analysis On Historical Maps

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Background

In public sectors such as **IGN** (Institut national de l'information géographique et forestière), **BNF** (Bibliothèque François-Mitterrand) or the **NA** (national archives) contains a large amount of important heritage of maps. These public sectors have already digitized a large part of these maps for public usage via a web portal, such as Geoportal service provided by **IGN**. However, only digitalized maps are not enough, and the maps should also be required geo-referenced and vectorized; in other words, the maps must be positioned in geographical space for professional use.

introduction

SoDUCo: **So**cial **D**ynamics in **U**rban **Co**ntext
Ultimate Goal: To better understand urban dynamics (eg. Paris from 1789-1950)
Urban dynamics: Evolution of cities

Why historical maps?

- There are many historical maps that can be used for different purposes.
- The rich information in old maps can be analysed for better understand the evolution of territory.
- For the future regional city planning.

Problem statement

1. The primary method for extracting information in historical maps still highly rely on the manual process.
2. Most of the maps do not have ground truth.
3. Texture information for identifying classes in maps is sometime ambiguous. (Objects with the same class have a different texture)
4. The texture of some maps is difficult to analyze.
5. There are existing many planimetric overlapped in maps.
6. The generalizability of existing systems is not robust for different map resources.

Extracting contents

- Lines
  - Roads
  - Elevation contour
- Text
  - Marks
  - Regions
- Land cover
  - Buildings
  - punctual objects like churches, mill

Goals

This research is separated into three phases. The first phase is to segment and classify image pixels. The second phase is to vectorize objects in maps. The third phase is geo-referenced maps, which is to assign geographical coordinates to each map pixel.

1. Image segmentation & pixels classification
2. Vectorized objects in the historical maps
3. Geo-reference vectorized objects into up-to-date maps

- Matching objects in different maps
- Create a stack of spatial temporal historical maps in different period

Information in historical maps

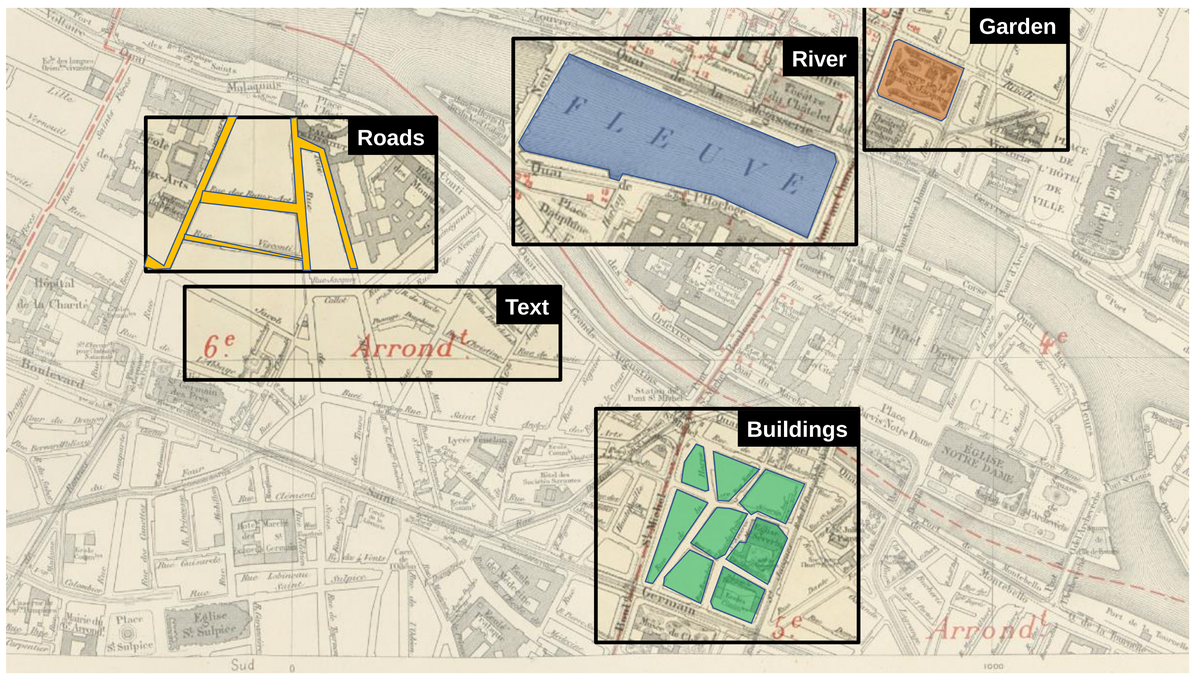

Fig. 1: Information in historical maps

Issues in maps

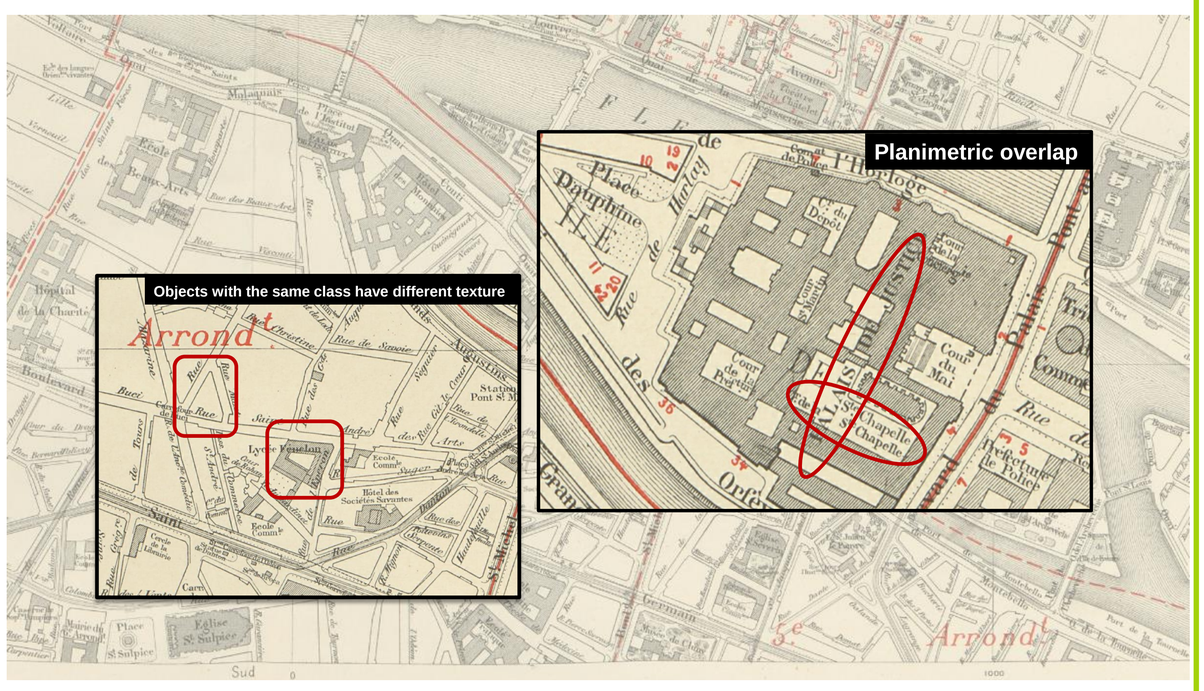

Fig. 2: Issues in maps

Methdology