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FINANCES PUBLIQUES

Use of artificial intelligence to update tax bases and the French cadastre

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1. The French cadastral map

The cadastral plan is a graphic representation of a municipality which draws up an inventory of its land properties as well as the floor-space of the buildings.

The cadastral plan can also indicate certain topographical details facilitating location.

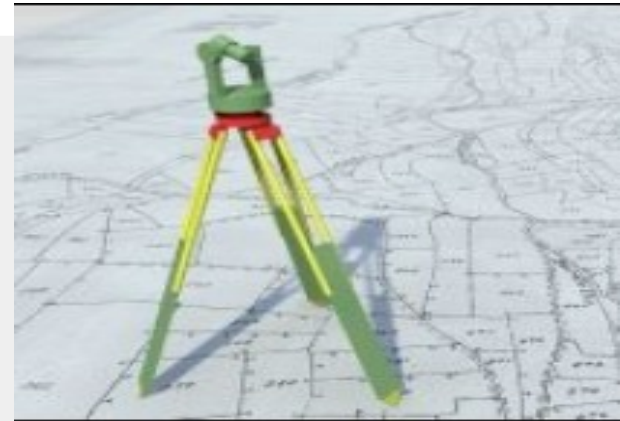




2. Current methods for updating the cadastral plan

Several processes to update the plan:

- surveys by terrestrial methods,
- positioning by satellites or photogrammetry,
- use of external plans;
- from orthophotographs to directly update the cadastral map or to detect changes and carry out a land survey.





3. Project goals

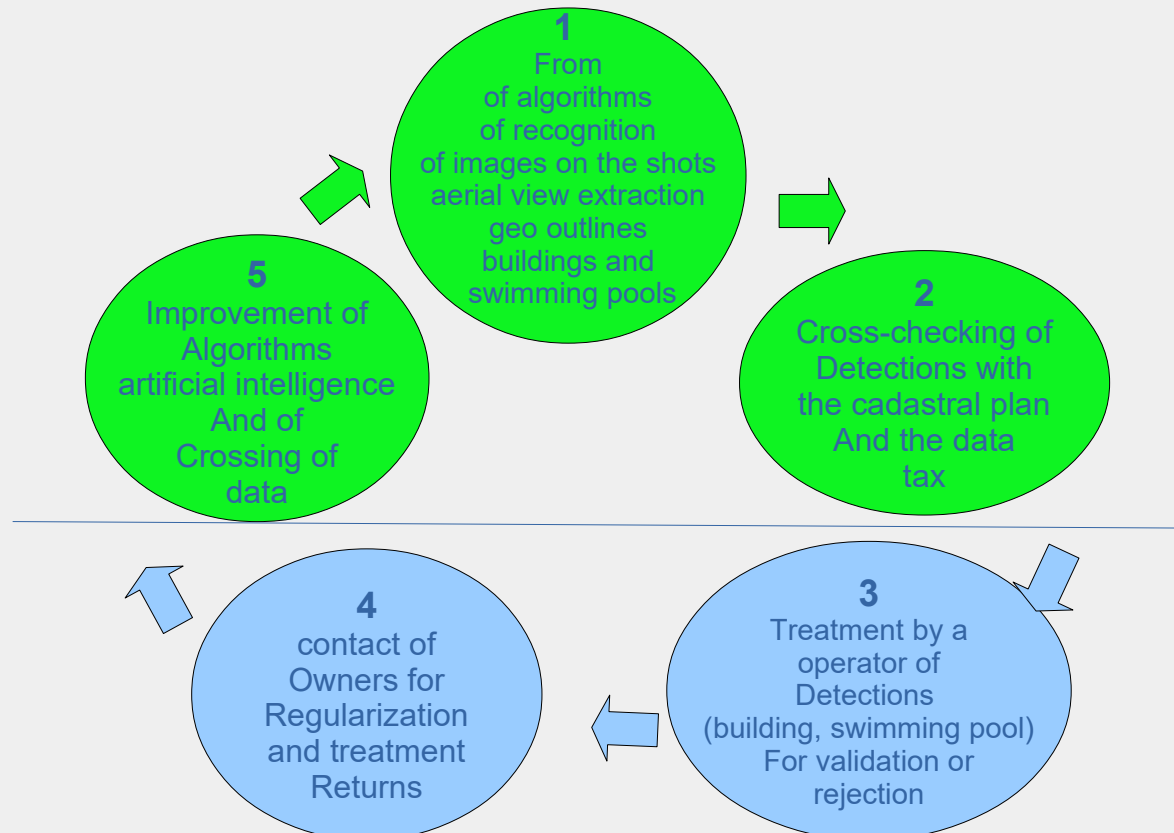
The exploitation of aerial shots from the National Institute of Geographic and Forest Information (IGN) using innovative technologies of artificial intelligence and data enhancement makes it possible to meet two objectives:

- Optimize the process of detecting constructions or developments, to make it possible to fight more efficiently against declarative anomalies and thus better respond to the wishes of fairness and tax justice of citizens, by the fair taxation of goods by making the tax bases more reliable
- Updating the outlines of the buildings detected by the algorithms on the cadastral plan



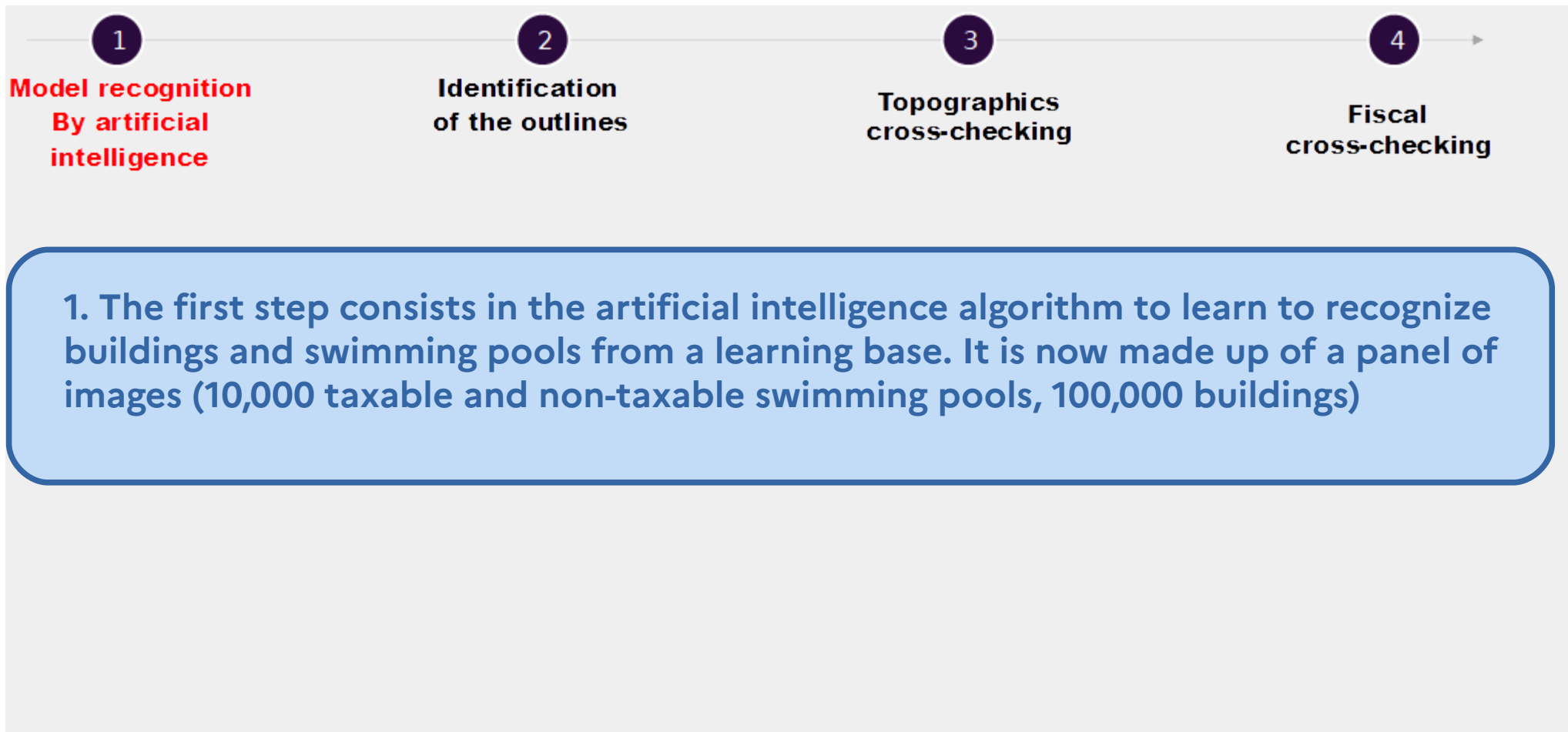
4. Use of artificial intelligence to detect buildings and swimming pools and represent them on the cadastral map

General presentation of the detection process on aerial shots of swimming pools and potentially non-taxable buildings as well as their treatment



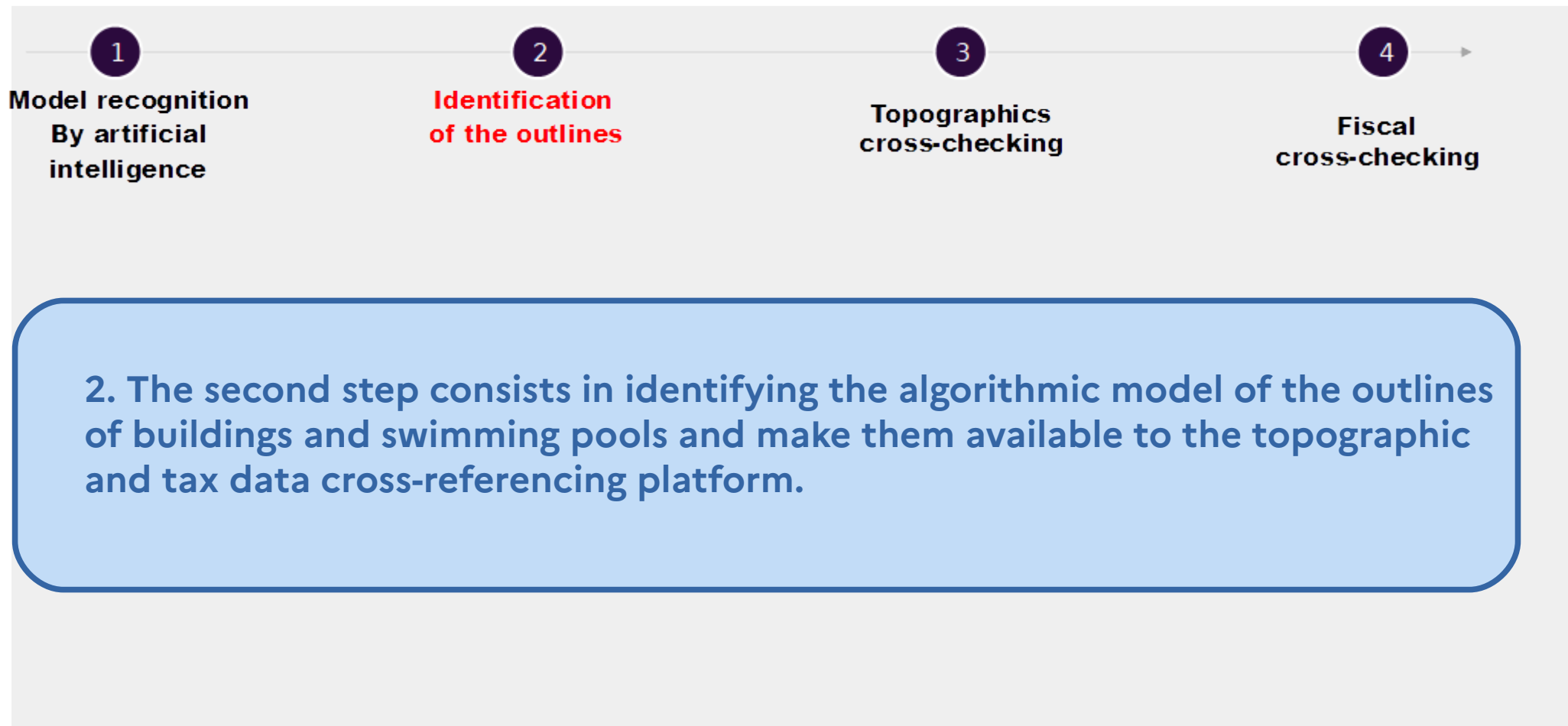


4.1 The processing carried out on the aerial shots processing platform (Step 1)



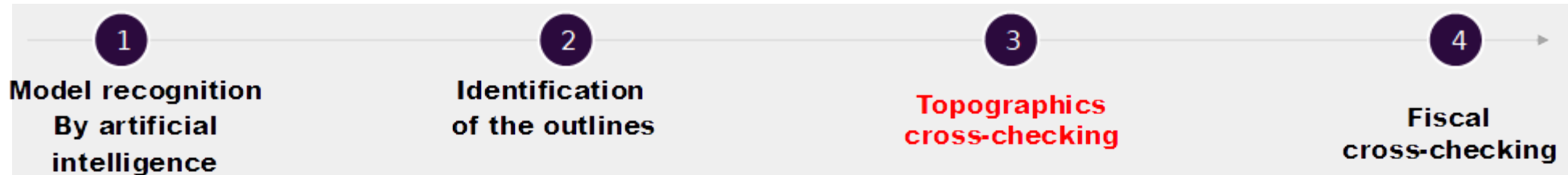


4.2 The processing carried out on the aerial shot processing platform (Step 2)





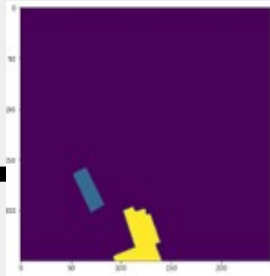
4.3 The processing carried out on the topographic and tax data cross-referencing platform (Step 3)



3. The object (building or swimming pool) detected is, from its geographical coordinates and following geomatics processing, automatically matched to its plot of land



Aerial shot at the
input of the
algorithmic
processing

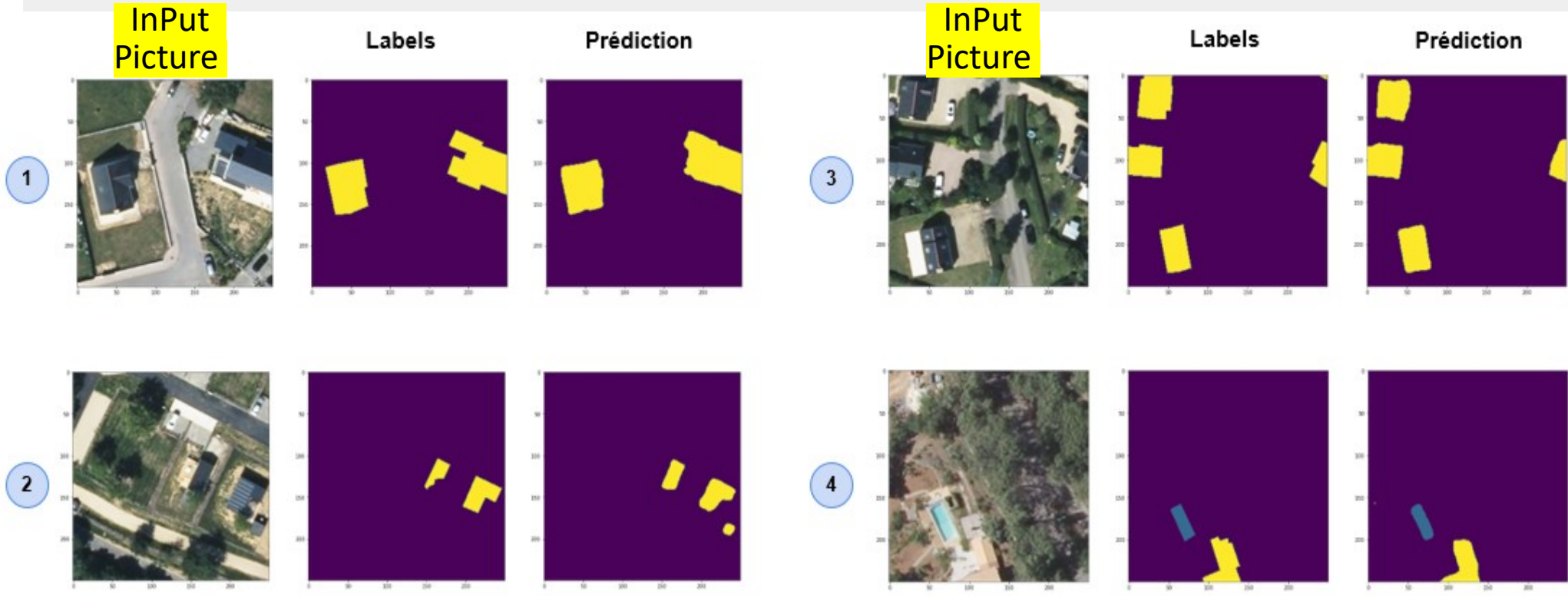


Pool outline
extraction



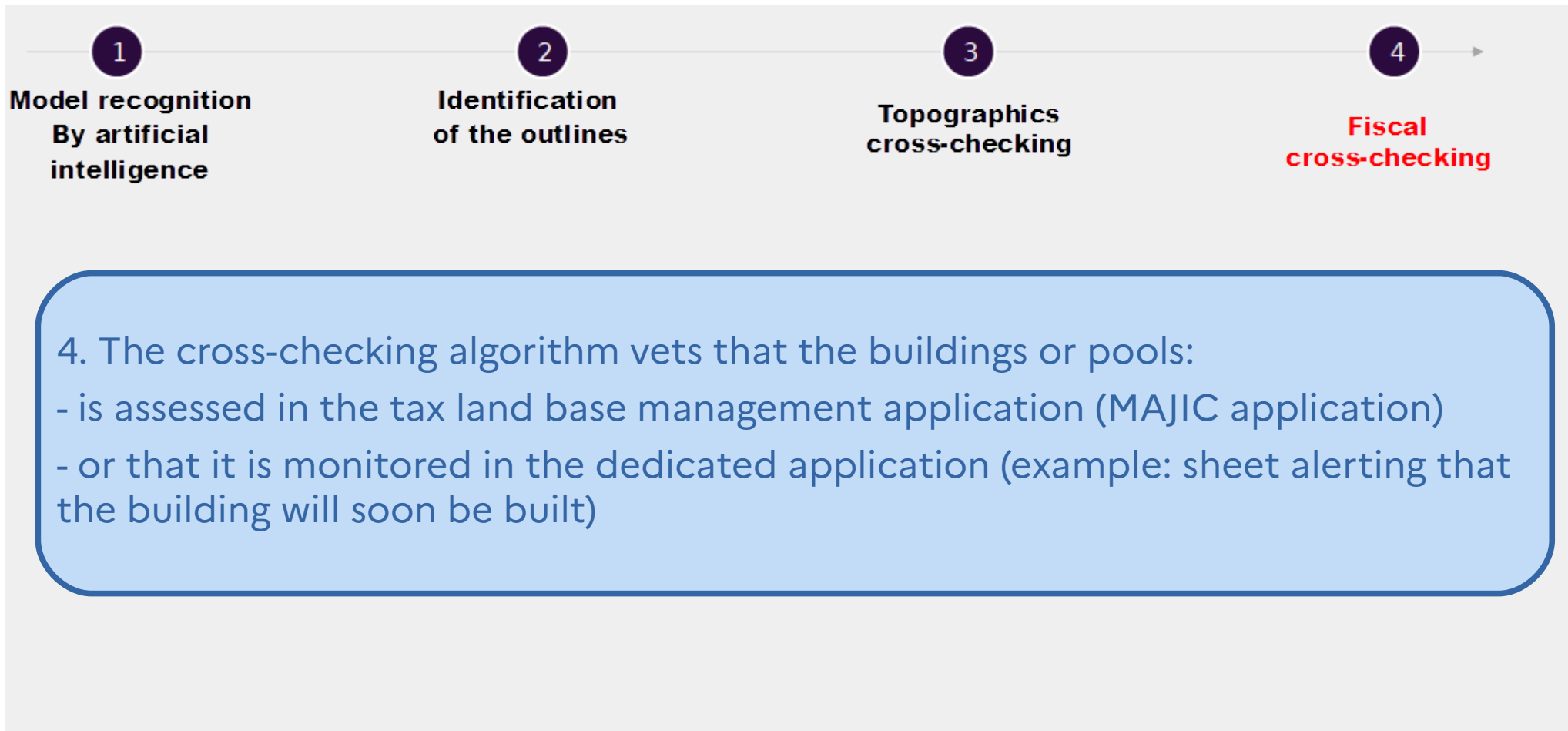
After processing, the
detection is readjusted
in relation to the
cadastral plan

Some illustrative examples output from the image processing platform





4.4. The processing carried out on the topographic and tax data cross-referencing platform (Step 4)





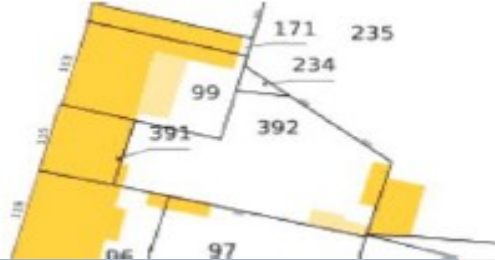
Illustrations of the detection and data cross-referencing steps

Detect a pool on the orthophoto



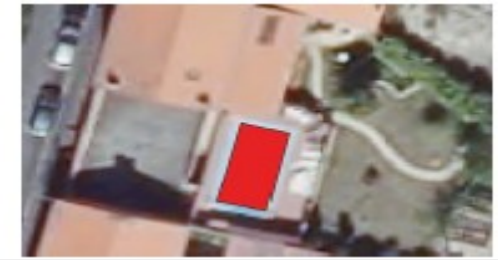
In both cases, the swimming pool is well detected on the orthophoto

cross with the cadastral plan

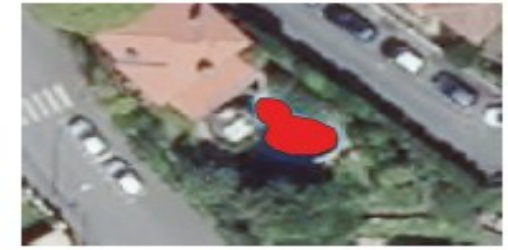


In both cases, the topographic intersection makes it possible to consider an absence in the cadastre plan

Cross-reference with tax data



In case 1, the swimming pool is not considered in the tax bases.
In case 2, the swimming pool is well assessed but absent from the cadastre plan





4.5. Principle to update the buildings detected by the algorithms on the cadastral plan

The update takes place in 3 stages

1

Identification of topographical and fiscal updates obtained from artificial intelligence processing on orthophotographs to be integrated into the plan automatically

2

Processing of the topographical updates via aerial shots in the plan management application

3

Update by ground survey of buildings that cannot be processed from aerial shots either by the AI or using the plan management application



4.5 Examples of shapes obtained from Artificial Intelligence from aerial shots

The first results of the algorithmic process of report on the plan of the detected objects

