OPPORTUNITIES AND CHALLENGES OF USING AI AT NATIONAL MAPPING AGENCIES – NGI BELGIUM CASE STUDY

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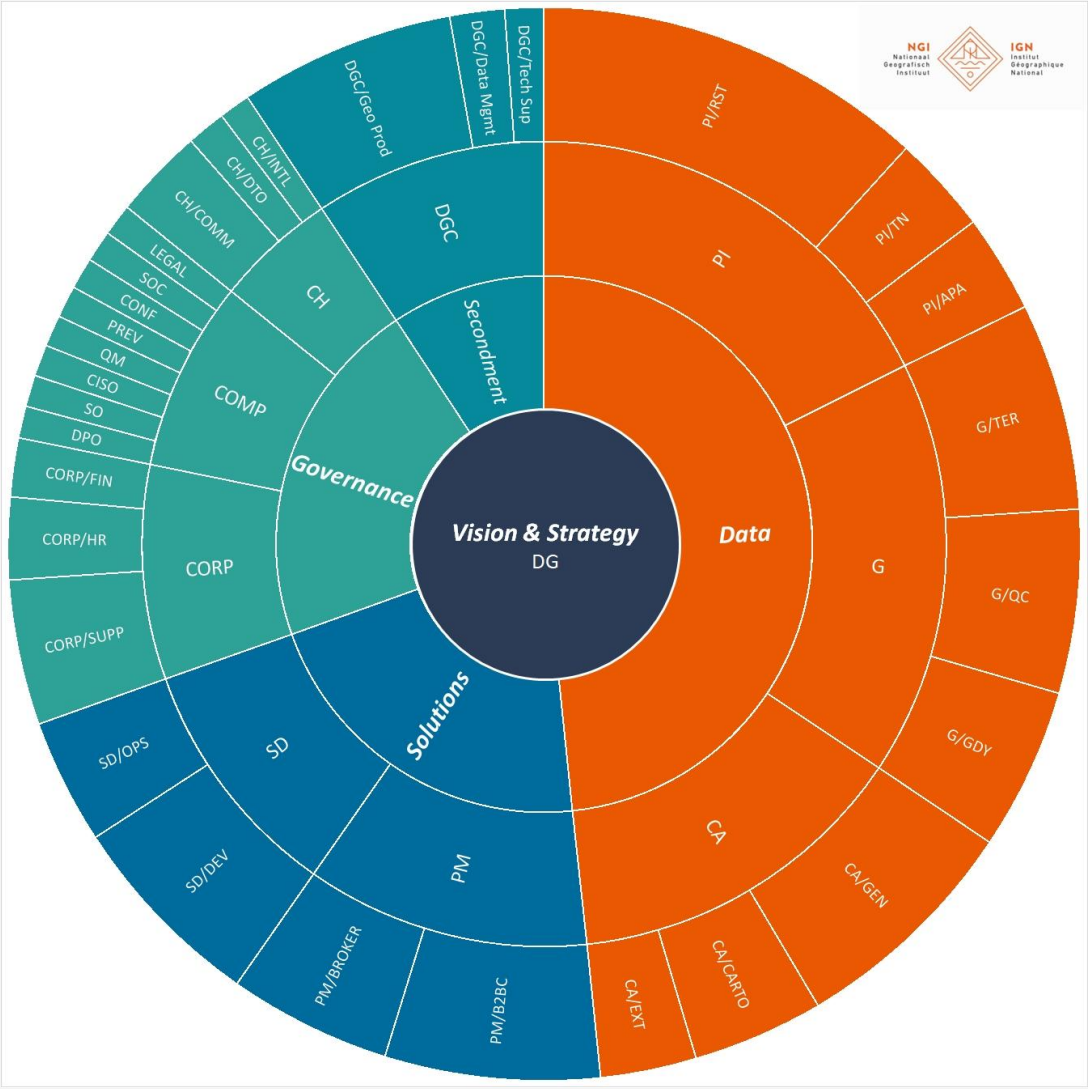
Table of Contents

1. NGI Belgium
2. Workflow large scale cartographic data
3. Where can AI help us?
4. Pilot project NGI Belgium
   a. Objectives
   b. Results
   c. Challenges
5. Next steps
6. Conclusion

NGI Belgium

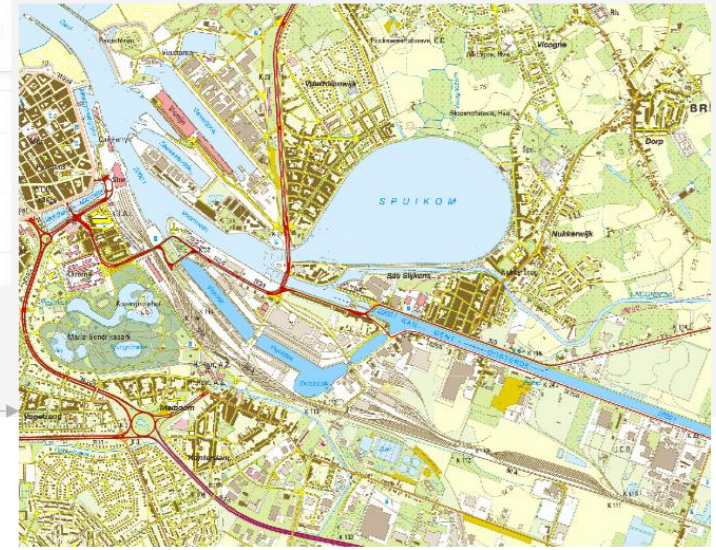
Legal mandate of NGI Belgium:

- Installation and maintenance of geodetic network and precision leveling network
- **Keeping topographic map up to date**
- to undertake works, studies and experiments that are of general interest within its field of activities



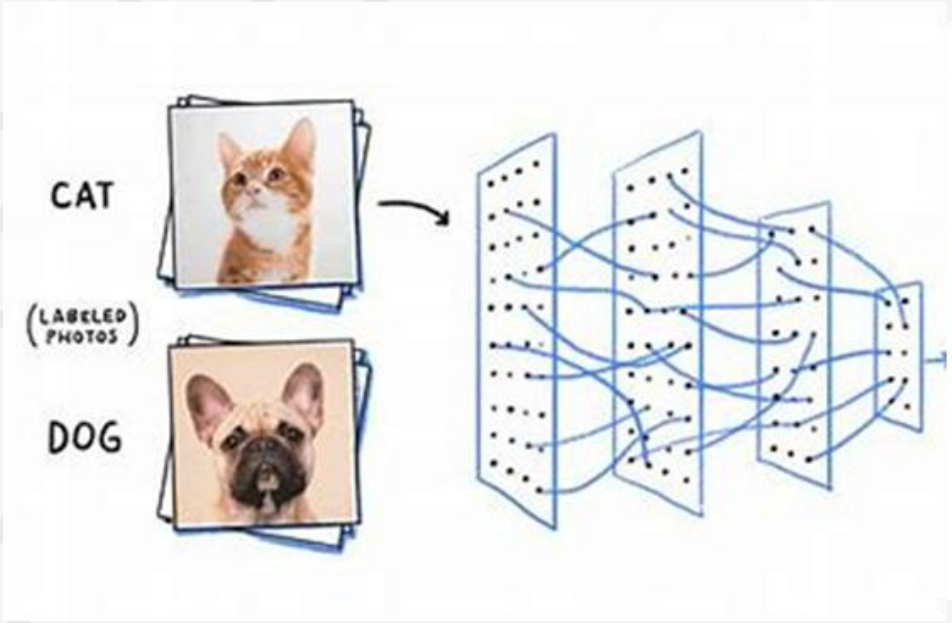
Workflow large scale cartographic data

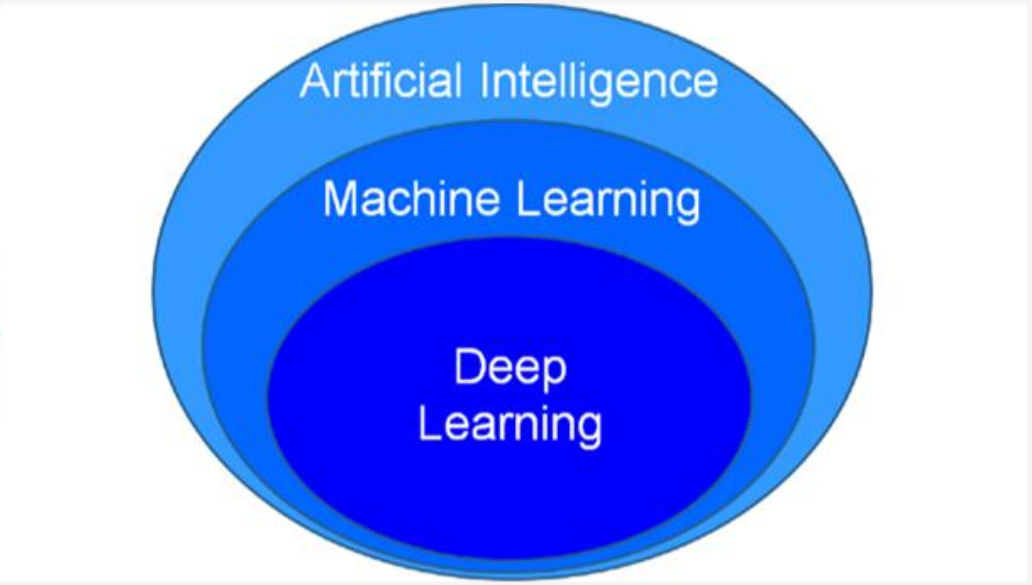
- Large scale ‘reference data’: ITGI Vref
- Manually scanning aerial images for changes
  - → takes a lot of time and resources!



Where can AI help us?

- Image recognition
- Deep learning
- Neural networks





Objectives

Pilot Project NGI Belgium

- Objective:
  - Can deep learning help QC team to more efficiently detect missing objects?
- Questions:
  - Which geographical objects?
  - What platform?
    - Software
    - Hardware
  - Which algorithm?
  - What further usages?

Objectives

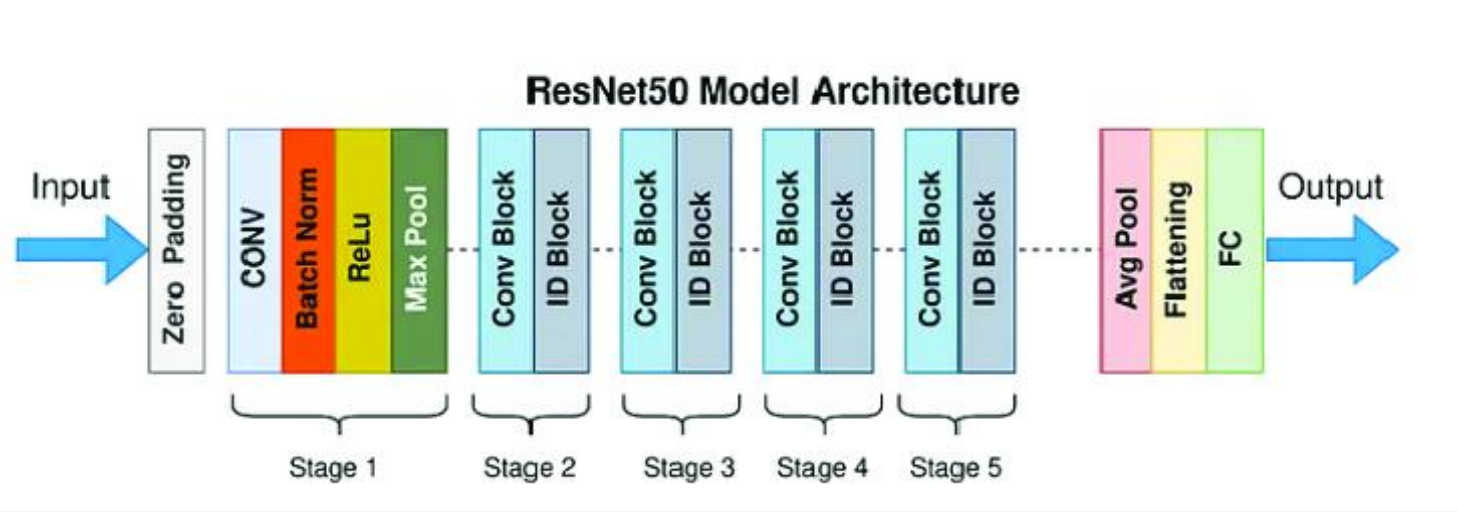
Pilot Project NGI Belgium

- Detection of buildings missing in our reference dataset, by creating an algorithm that detects buildings that are visible on aerial image but are not present in our data
- Tool used: ArcGIS Pro Deep Learning toolset

Results

Pilot Project NGI Belgium

- Model architecture: ResNet50
  - 50 layers, 23 million trainable parameters
- Train / test: 90 / 10
- Epochs: 20
- Training time: 12h on 1 GPU



Results

Pilot Project NGI Belgium

Challenges

Pilot Project NGI Belgium

- Resolution changes in aerial photographs
- New model architectures
- Recognizing other features
- Including Lidar data
- What infrastructure to use?
- In house competence or outsourced?
- …

Next steps

- Infrastructure choices:
  - Buying GPUs for our on-premise servers?
    - How many do we need?
    - Especially in beginning GPUs will only be used certain moments
    - Technological evolutions next years
    - Expensive!
  - → Public cloud better choice to make
    - Talks with public cloud vendors
    - Choice made based on pricing and ‘openness’ of solution

Next steps

- Clear and useful business case(s)!
- Contact with possible AI partners:
  - A lot of companies are eager to work with us
  - Fast development of new models
  - Learning from these partners
- Getting competences in-house?

Thanks for your attention!