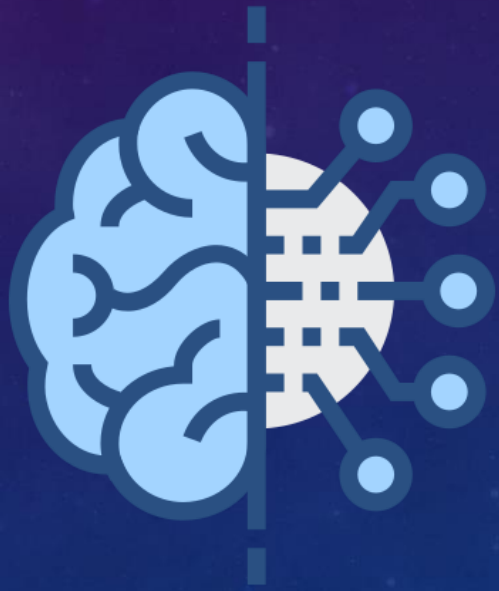
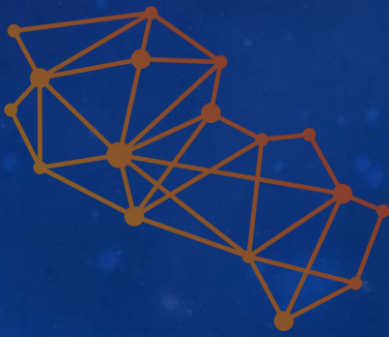
A Machine Learning Algorithm for Building Structure Detection from Aerial Imagery



REPUBLIC OF ARMENIA

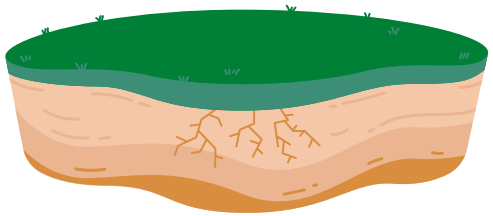
CADASTRE COMMITTEE



Legislative Changes in Creation Of Real Estate Tax Bases in the Republic of Armenia

Before 2021

Land tax



Building tax

≈ 9.0 billion AMD

After 2021

Positive impact on the economy

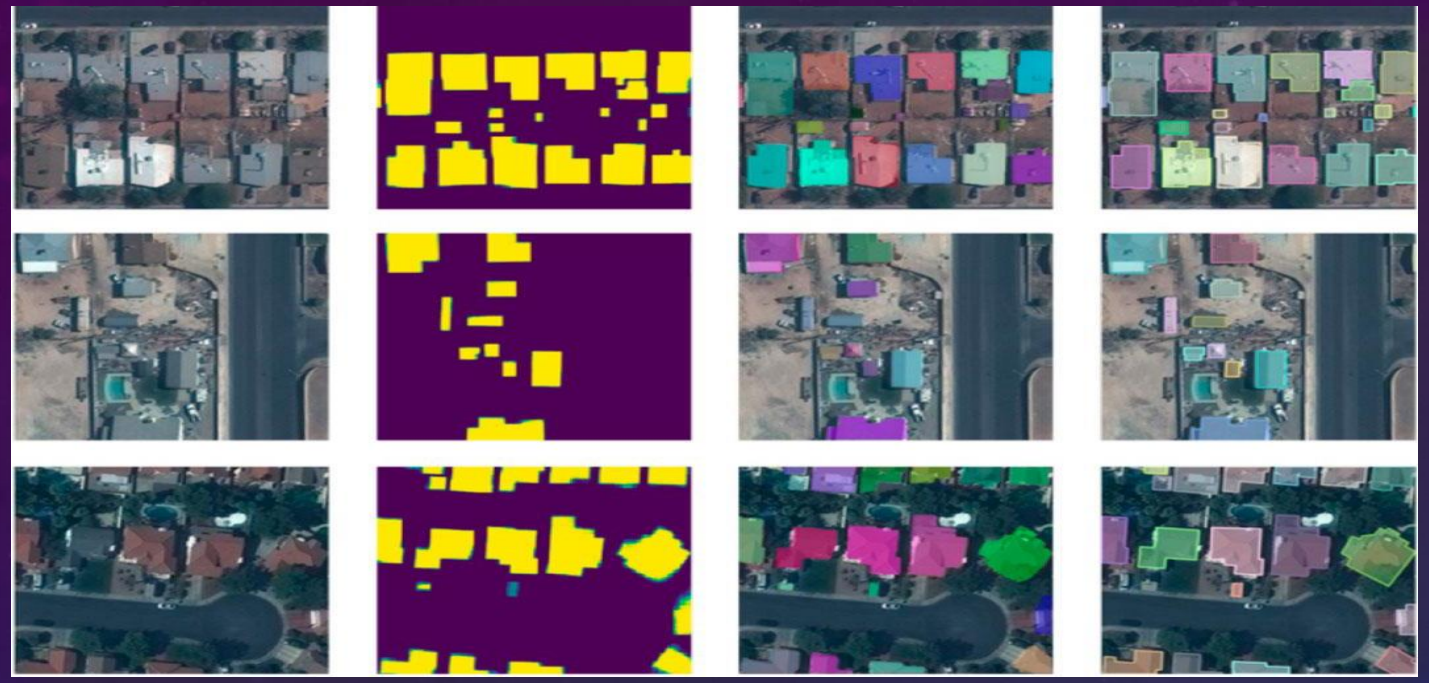
Real estate tax

municipalities

2022` 30% — ≈ 16.5 billion AMD

2026` 100% — ≈ 48.0 billion AMD

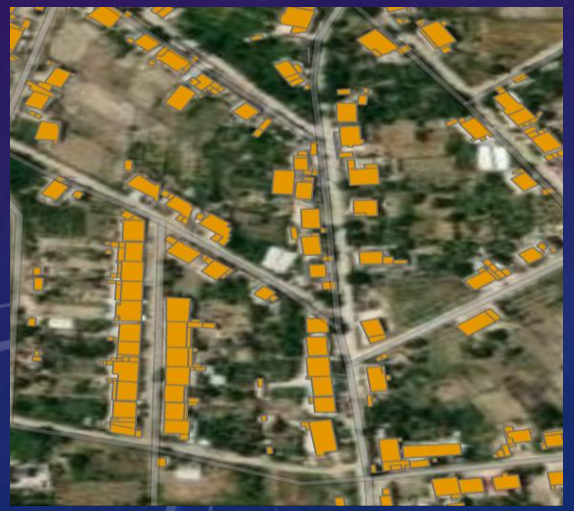
A machine learning algorithm for building structure detection from aerial imagery



The purpose

Develop and implement machine learning algorithms for detection and mapping of objects on aerial images, which will enable automatic detection and classification of buildings in an online environment.

Validation data
(cadastre layer **#building**)



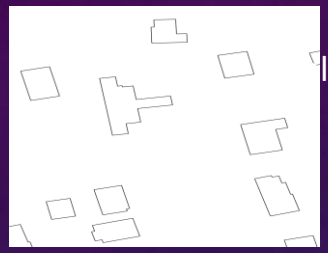
High resolution aerial image
(2014, 2021)

Digital relief model/isoline
#DTM of the research area

Learning data (#training_data)

BUILDING - CONSTRUCTION DETECTION SCHEME

Learning data



lidation data

The model was tested for settlements with different highland zones in RA

Ararat marz, settlement Pokr Vedi

Syunik marz, settlement Khot

Vayots Dzor marz, settlement Aghavnadzor

Comparison with layer of cadastral building - construction *Disclosure* of buildings

The comparison was carried out for the settlement of Pokr Vedi, for which we have the following indicators

separated from the cadastral map (manually)	13
automatically generated	14
combination	1
total	26

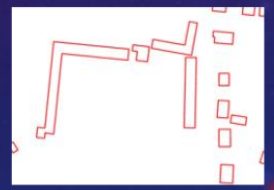
Figure

Learning data

Validation data

Comparison with cadastral maps

Algorithm



The accuracy of this model is 91.5%.

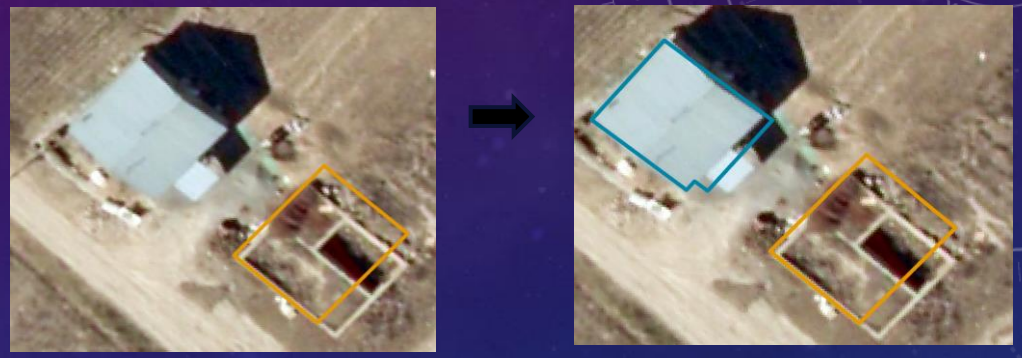
However, it is necessary to use a digital relief model in large, highly fragmented, coastal, hilly areas, where the margin curve accuracy is 70%, for the improvement of which a digital model of the relief will be used.

Comparison with layer of cadastral building

Disclosure of buildings

Cadastral map

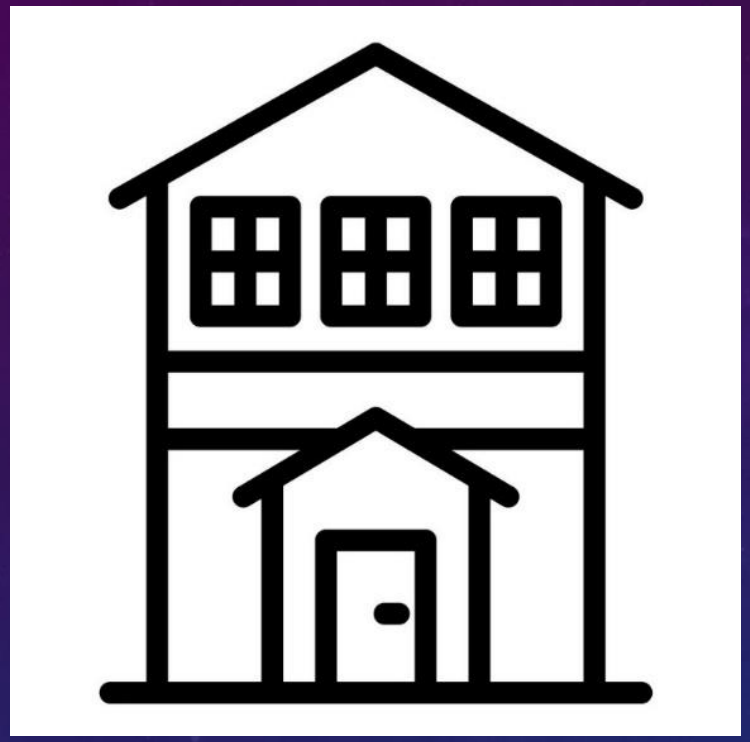
Machine learning



- Work automation;
- Reduction of time and resources,
- Disclosure of buildings that are missing from the property tax base

Cadastral map

Detected buildings



! About 64 500 buildings found using AI tools

! About 40 000 included in the property tax base