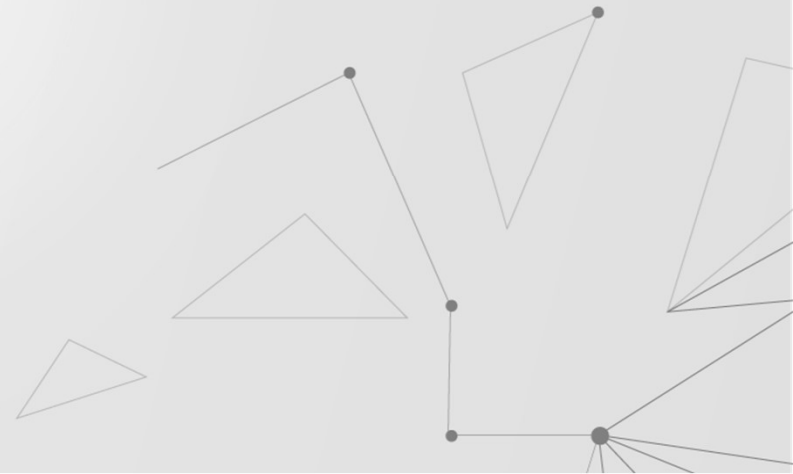


GEOspatial Artificial Intelligence (GEOAI)

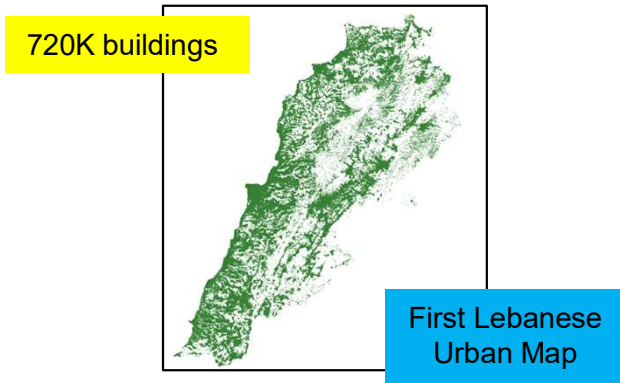
www.geogroup.ai

May 2023

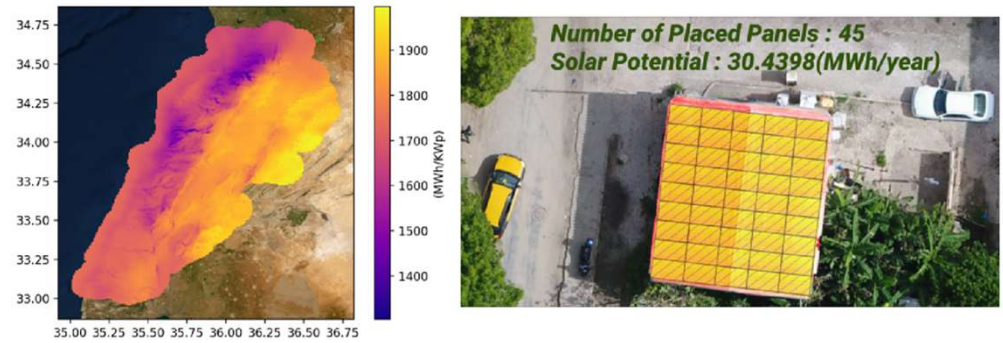


GEOAI

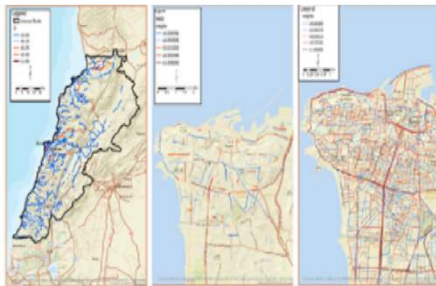
Urban-AI Mapping



Solar rooftop potential map



Road Crashes Observatory



Water Body Monitoring

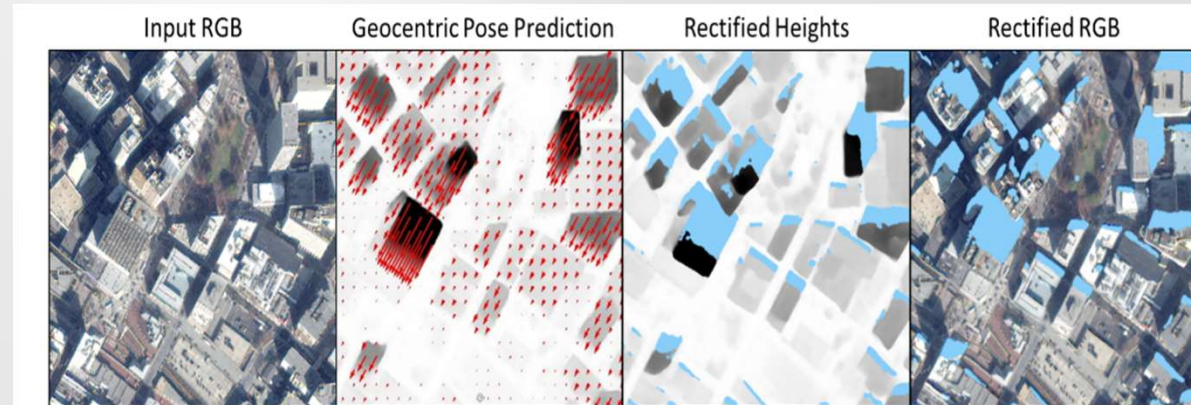


Crop Monitoring



Urban-AI Mapping

- **Building Instance Segmentation** based on proprietary multi-class instance segmentation algorithm
- **Online demo:** <http://geoai.cnrs.edu.lb/urbanmodels/>
- **Geopose Estimation:** Buildings Height and orientation extraction



Urban-AI Mapping – cont.

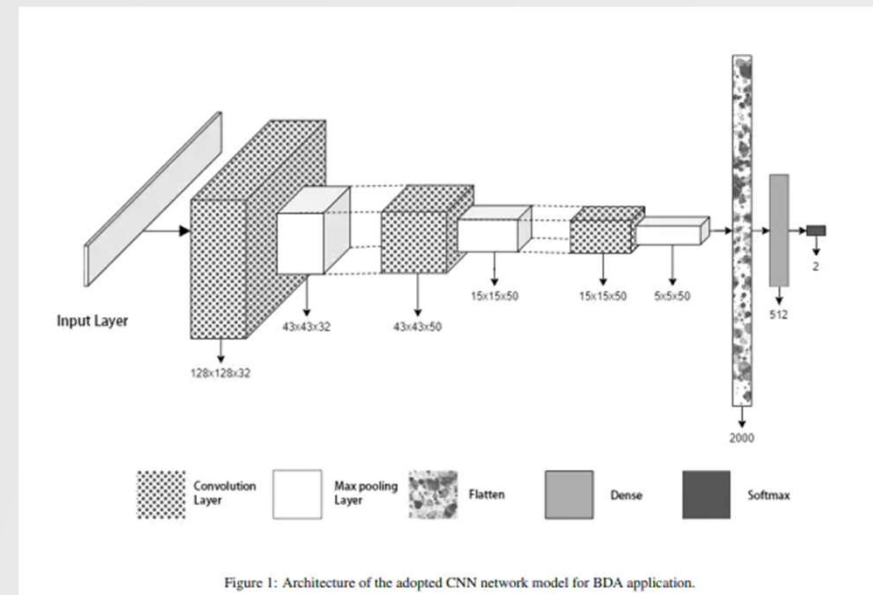


Scale Invariant model to segment buildings from various sources with different spatial resolution (from 2 cm onwards)

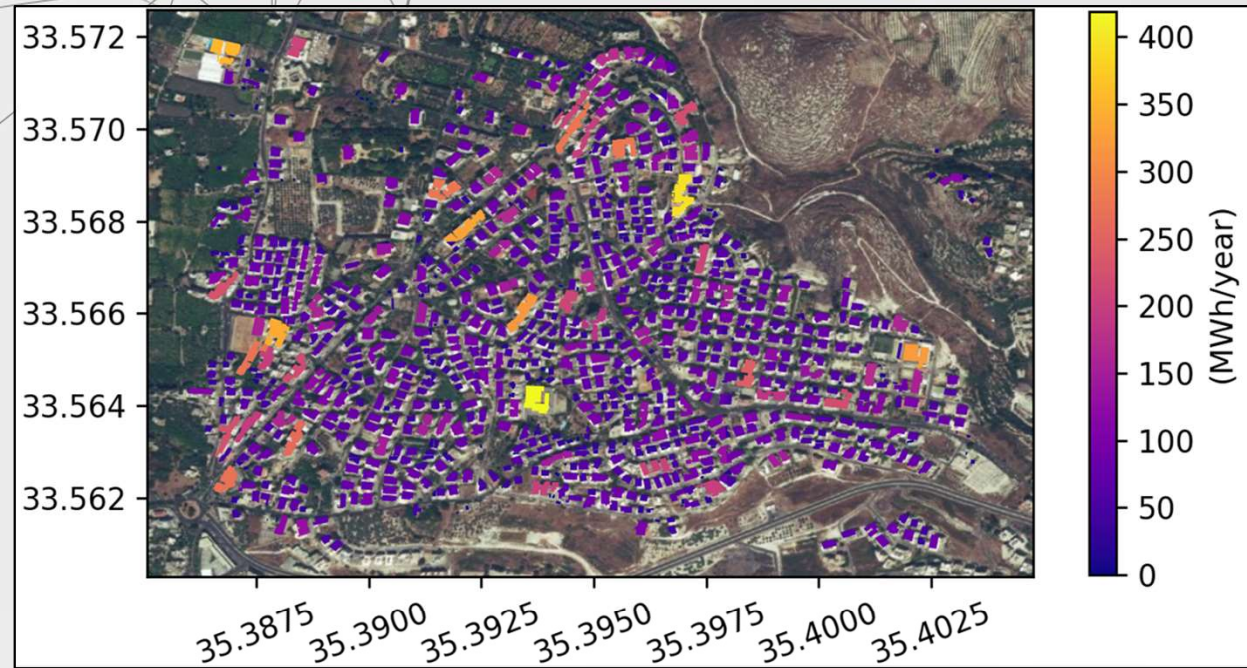


Urban-AI Mapping – cont.

1. Buildings Type Classification (Residential/Non-residential)
2. Buildings Damage Assessment (Damaged/Not-damaged)



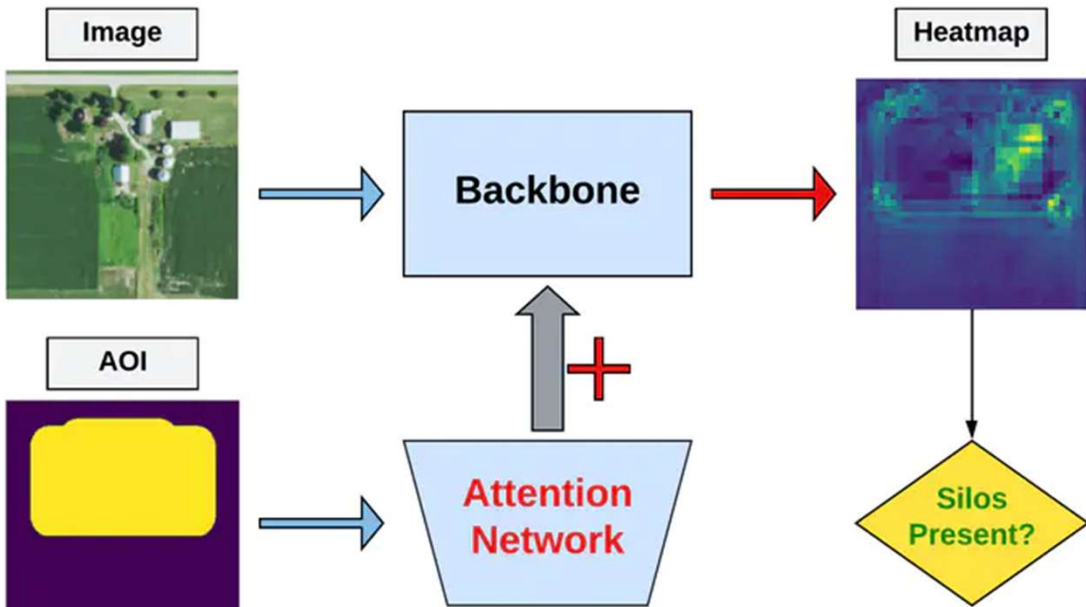
Urban-AI Mapping – cont.



Solar Rooftop Potential Estimation based on:

- 1. Extracted Footprints Map.**
- 2. Solar Panel Placement Algorithm.**
- 3. Specific PVout Map for every geographical roof location.**

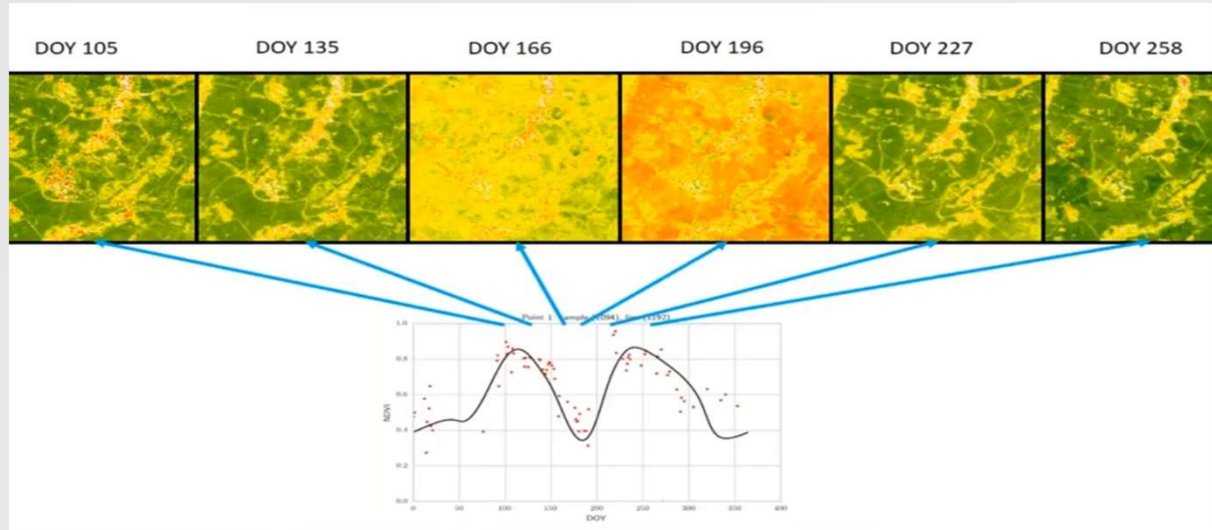
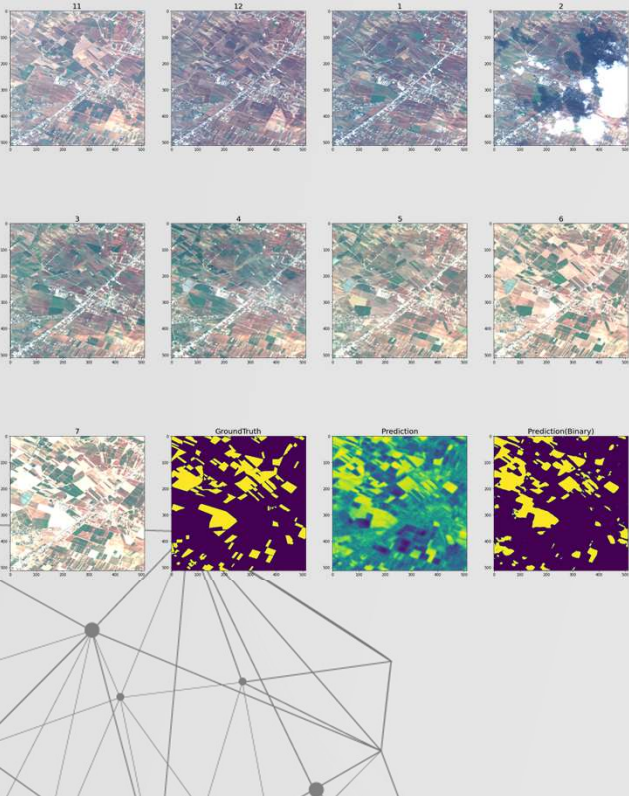
Urban-AI Mapping – cont.



- Silo bins location is often required by decision support systems.
- detected the presence of silos on ~8MM AOI across different states in USA

Crop Monitoring

- **Field delineation**
- **Crop type identification**
- **Crop yield estimation**



This is what people and satellite see!

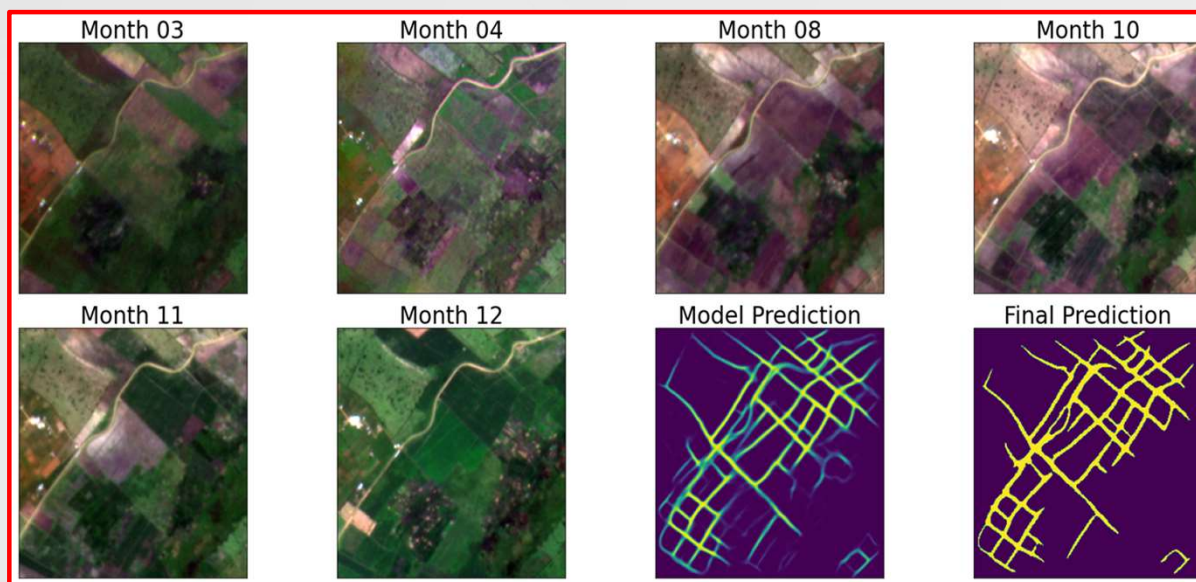


This is what people really care about!



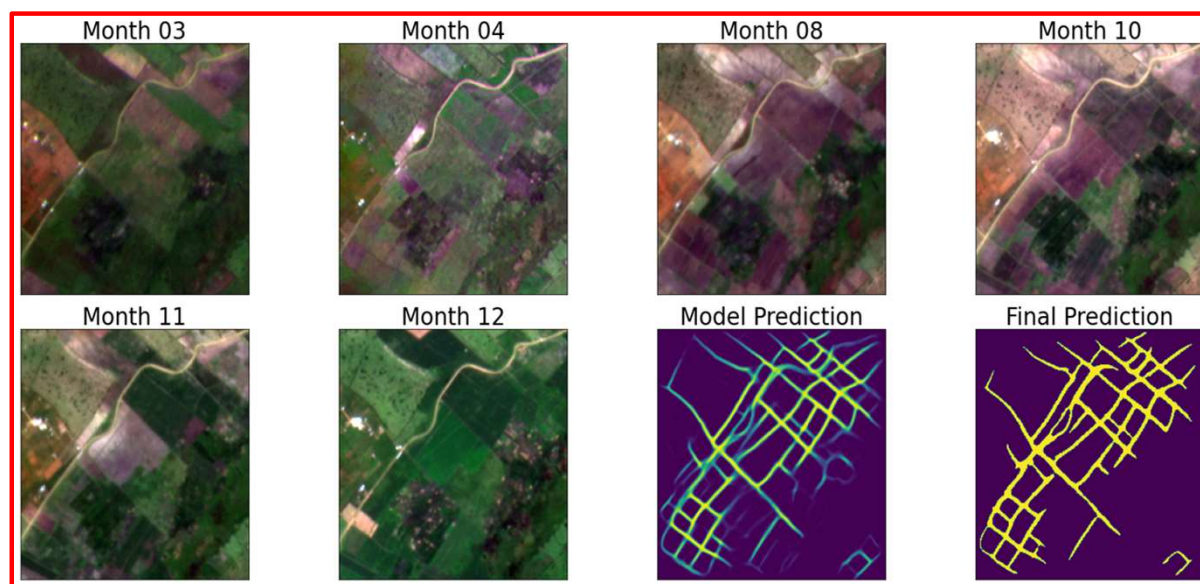
Nasa Harvest : Field Boundary Detection Challenge

- Segment crop field boundaries given a time-series of observations.
- Ranked 4th (out of 730) in this highly competitive challenge.
- Earned a Gold Medal 🏆
- Solution repo:
https://github.com/geoaigroup/nasa_harvest_boundary_detection_challenge



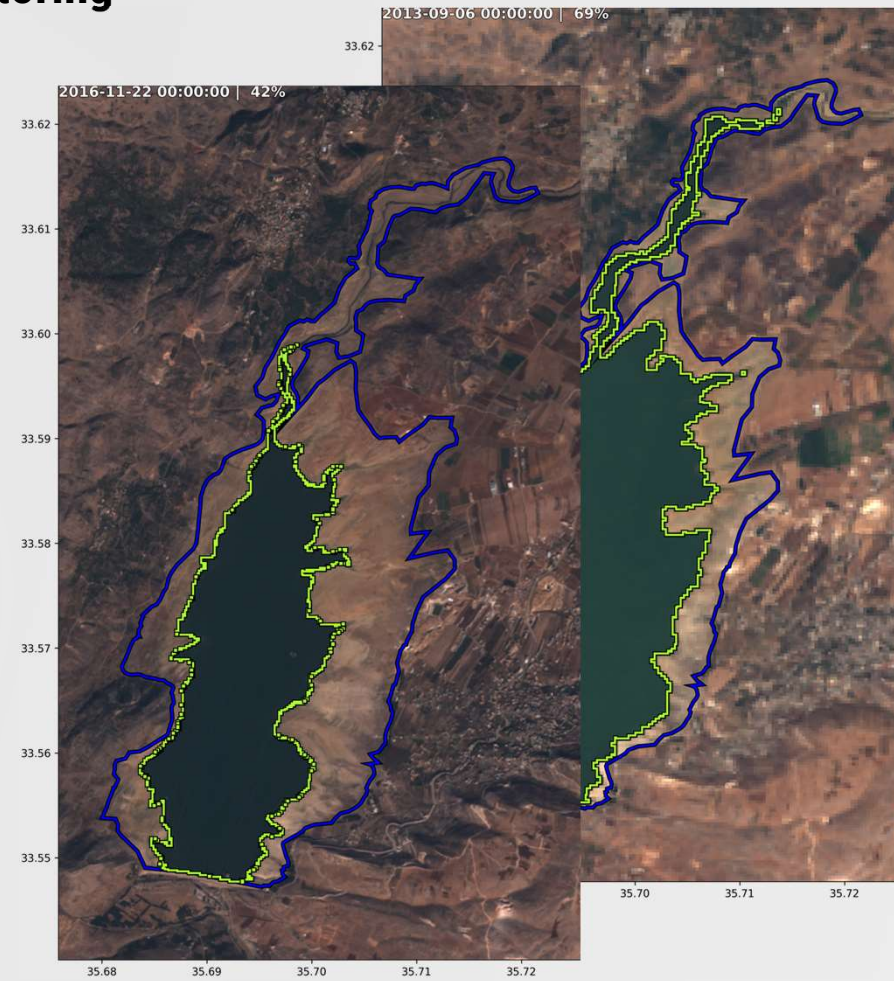
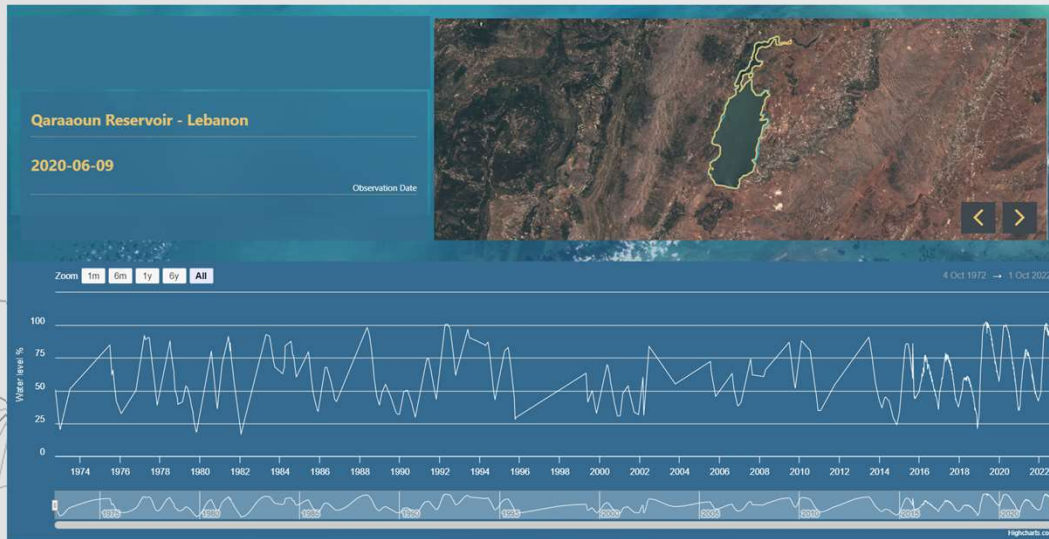
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Waterbodies monitoring

- **Water volume estimation on a Weekly-basis, in addition to**
- **Water body temperature**
- **Water quality indices**
- **Aggregated 50 Years time-series since 1972**



Explainable Artificial Intelligence (XAI)

Input data



Deep learning model

Recurrent Network



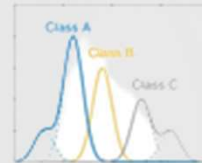
Produce an interpretable model



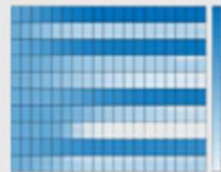
Evaluate interpretability



Feature importance



Probabilities



Activations

Provide information for decision making

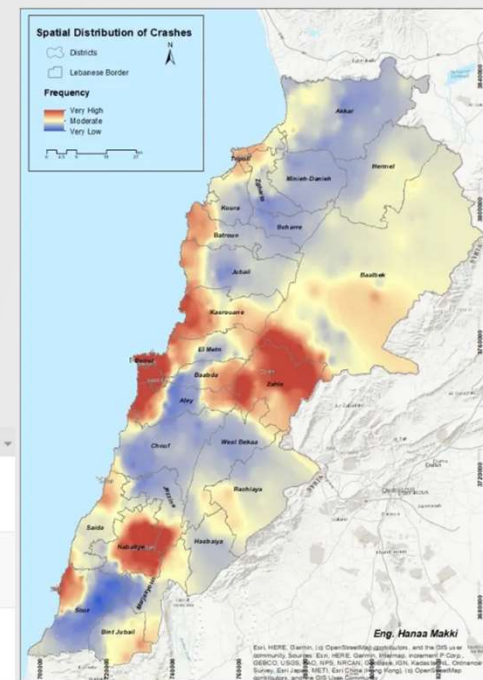
Classification Segmentation



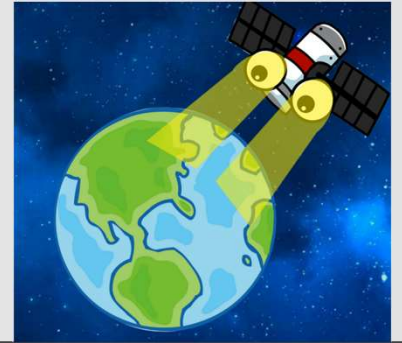
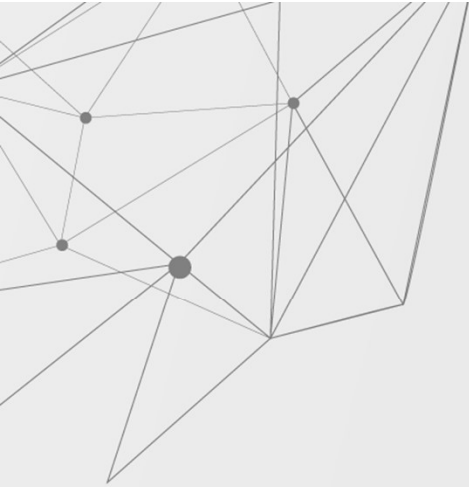
Lebanese Observatory for Crashes on Road (LOCR)



- Thousands of coding lines done in Python
- Continuous development and support
- ~ 80,000 tweets & 30,000 posts processed since 2015
- ~22,000 road crashes as of May 2023



ID ACC	TEXT ACC	DATE ACC	SOURCE ACC	VICTIMNB ACC
638176137575710720	قتل و ١٠ جرحي جراء انقلاب ياص @LeblSF @tmclebanon http://t.co/OGr8hL1kg1	Aug. 31, 2015, 5:27 a.m.	RedCrossLebanon	1
1027148830574297088	قتل و 10 جرحي الحاصلة النهائية لتحادث المروري الذي حصل على طريق عام #بيشامون بكجاه #مخلة #كفنايف	Aug. 8, 2018, 2:05 p.m.	tmclebanon	1
579920311895900160	قتل #الصليب الأحمر اللبناني ١٠ جرحي من حادث سير في مخلة #الخاروبة @tmclebanon http://t.co/xkWWARqMnB	March 23, 2015, 10:19 a.m.	RedCrossLebanon	0



Thanks

www.geogroup.ai

