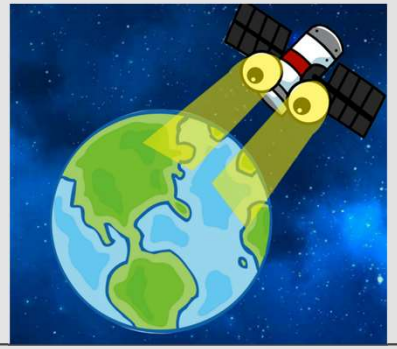


GEOspatial Artificial Intelligence (GEOAI)

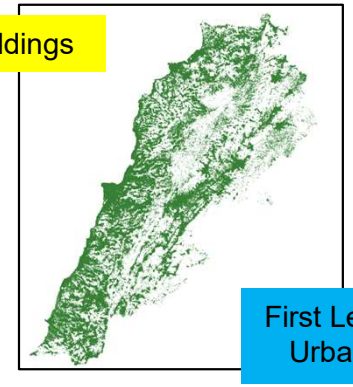
www.geogroup.ai

May 2023

GEOAI

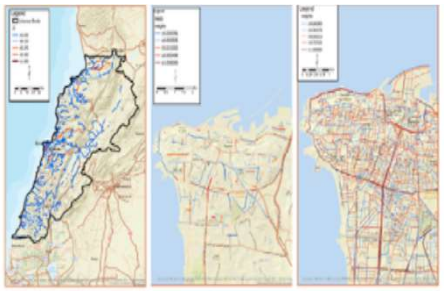
Urban-AI Mapping

720K buildings

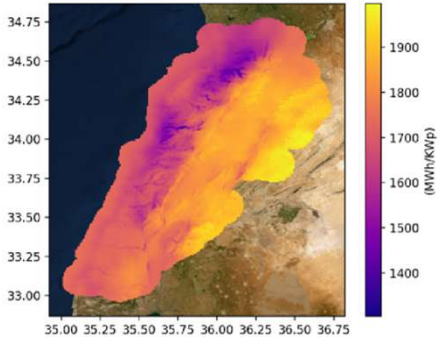


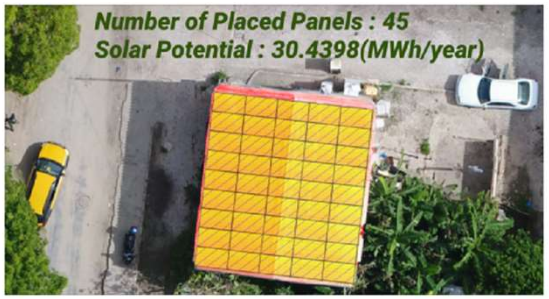
First Lebanese Urban Map

Road Crashes Observatory

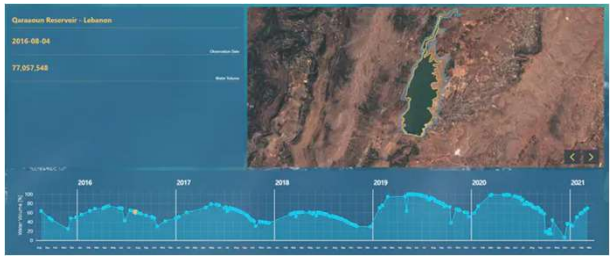


Solar rooftop potential map

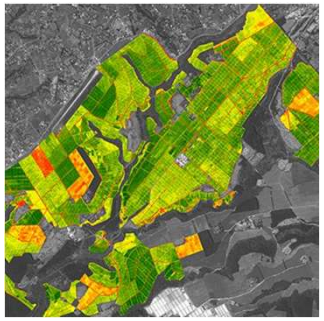




Water Body Monitoring

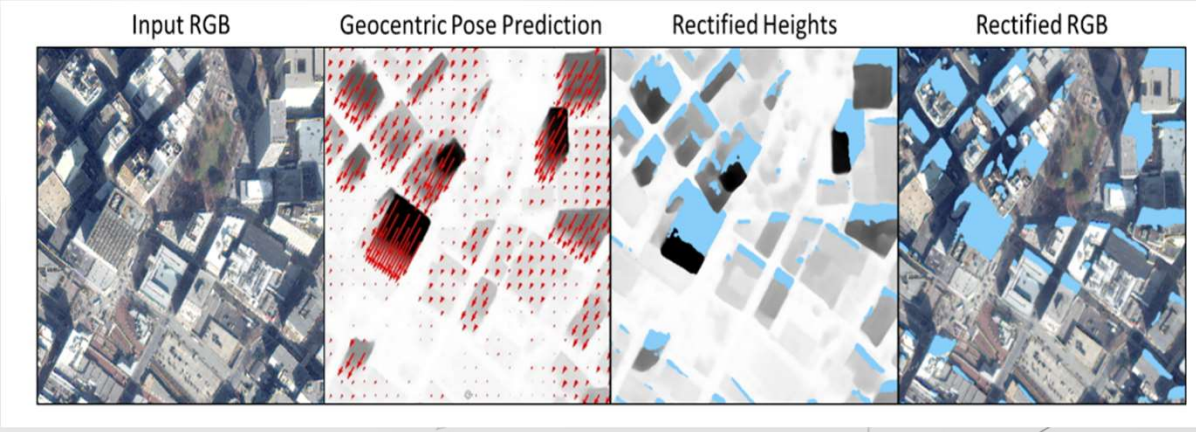


Crop Monitoring



Urban-AI Mapping

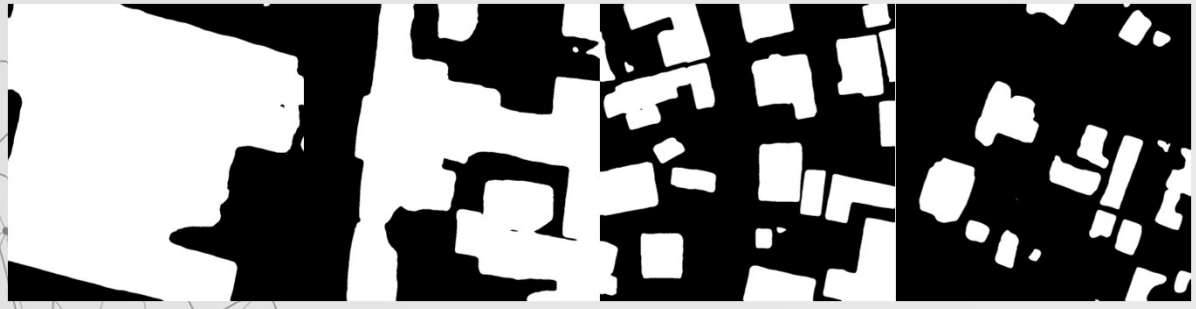
- **Building Instance Segmentation based on proprietary multi-class instance segmentation algorithm**
- **Online demo: http://geoai.cnrs.edu.lb/urbanmodels/**
- **Geopose Estimation: Buildings Height and orientation extraction**



[1] Christie, Gordon, et al. "Single view geocentric pose in the wild." *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2021.

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)**

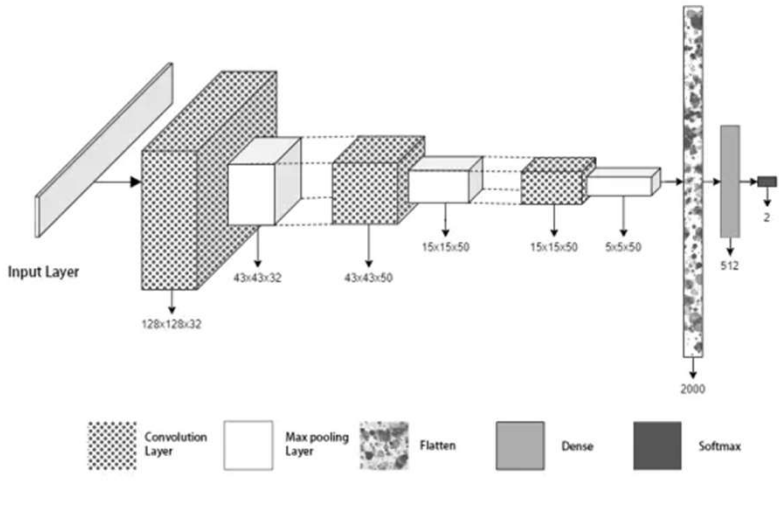
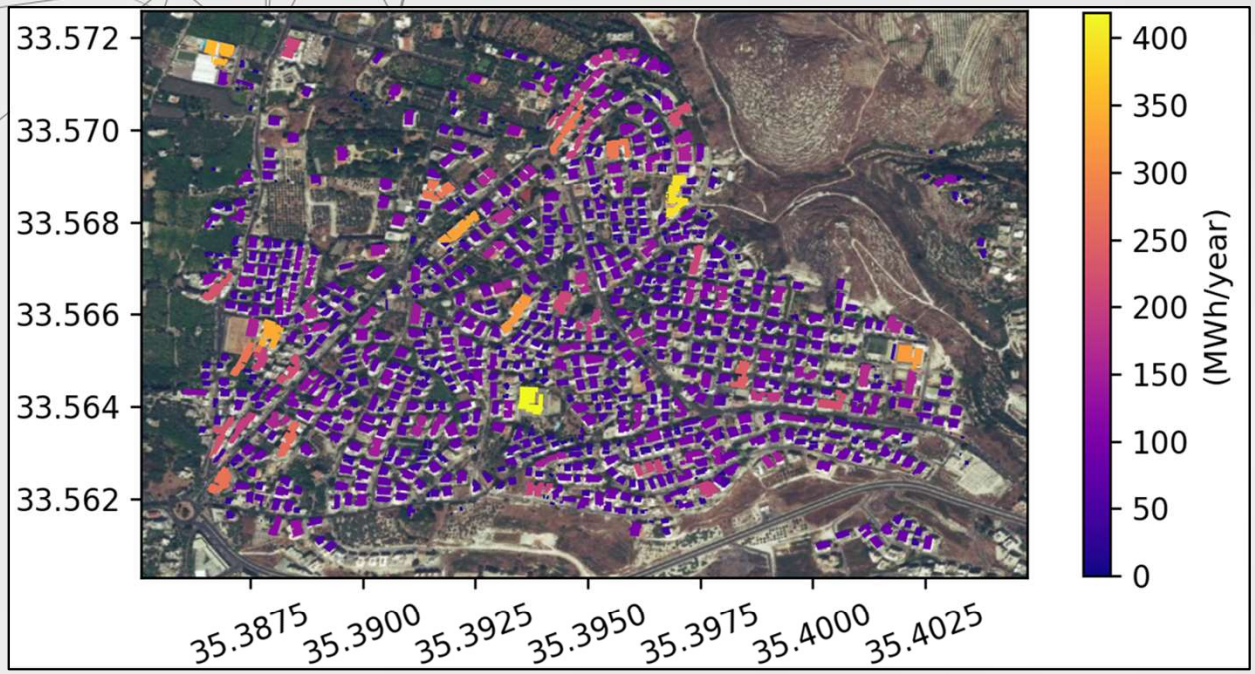


Figure 1: Architecture of the adopted CNN network model for BDA application.

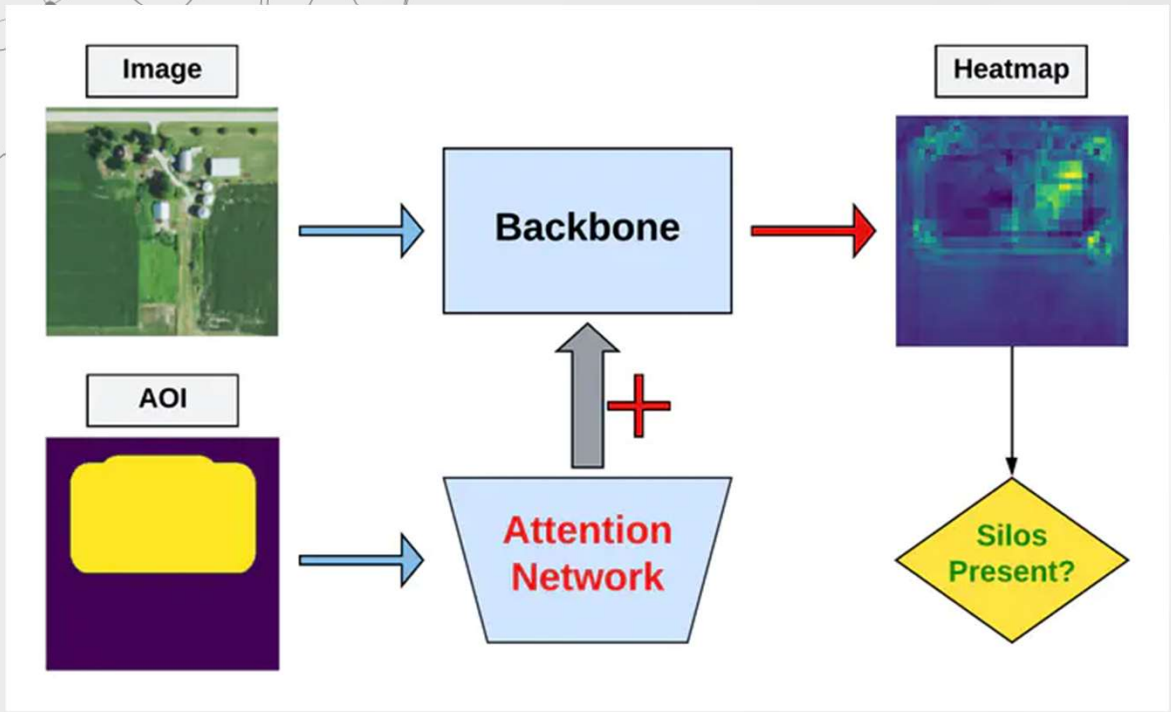
Urban-AI Mapping – *cont.*



Solar Rooftop Potential Estimation based on:

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

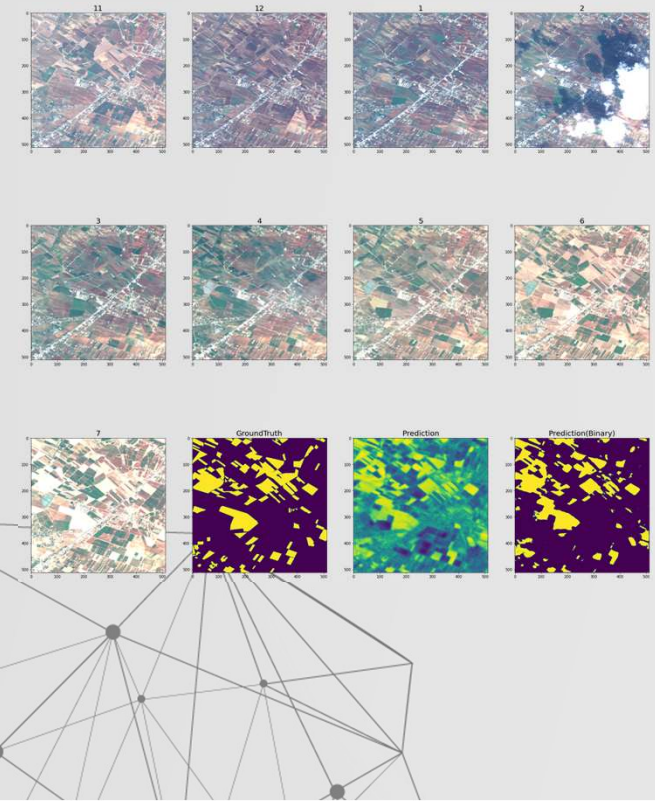
Urban-AI Mapping – *cont.*

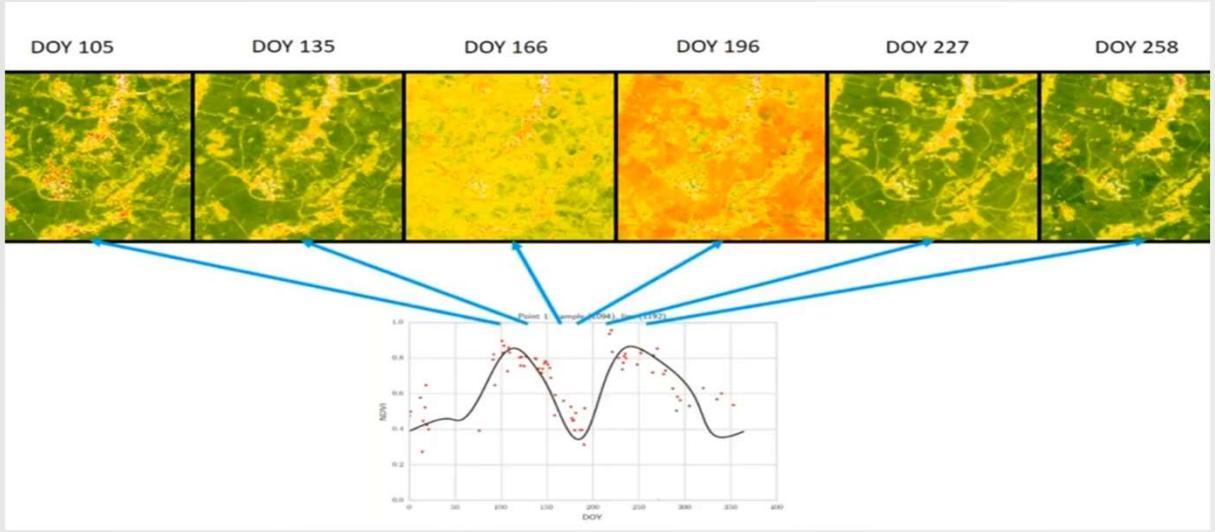


- Silo bins location is often required by decision support systems.
- detected the presence of silos on ~8MM AOI across different states in USA

Crop Monitoring

- Field delineation
- Crop type identification
- Crop yield estimation



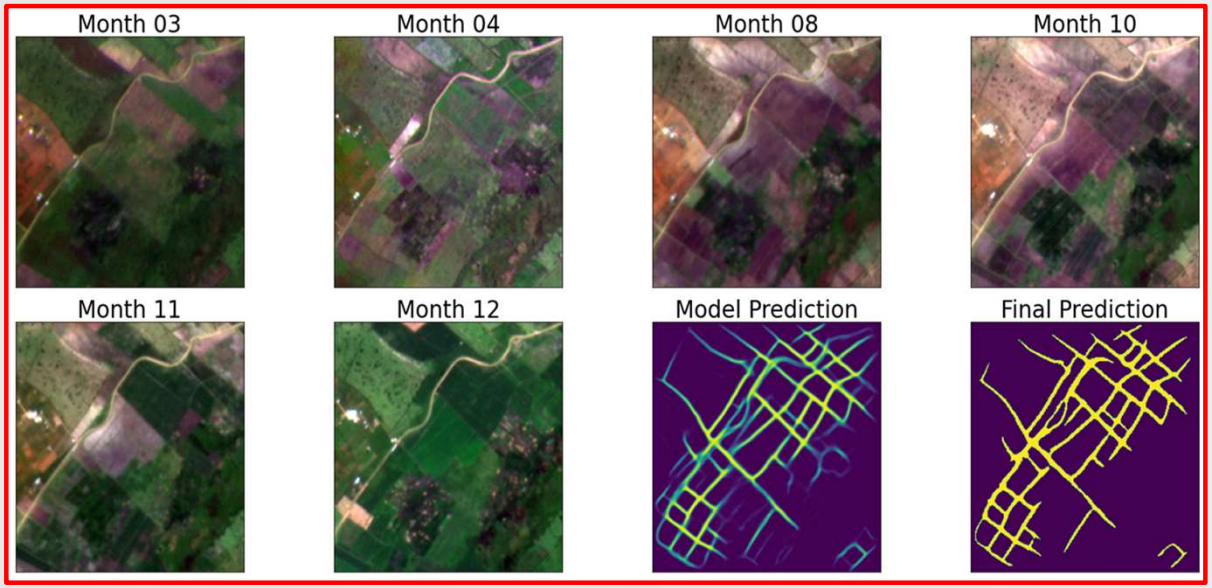


This is what people and satellite see!

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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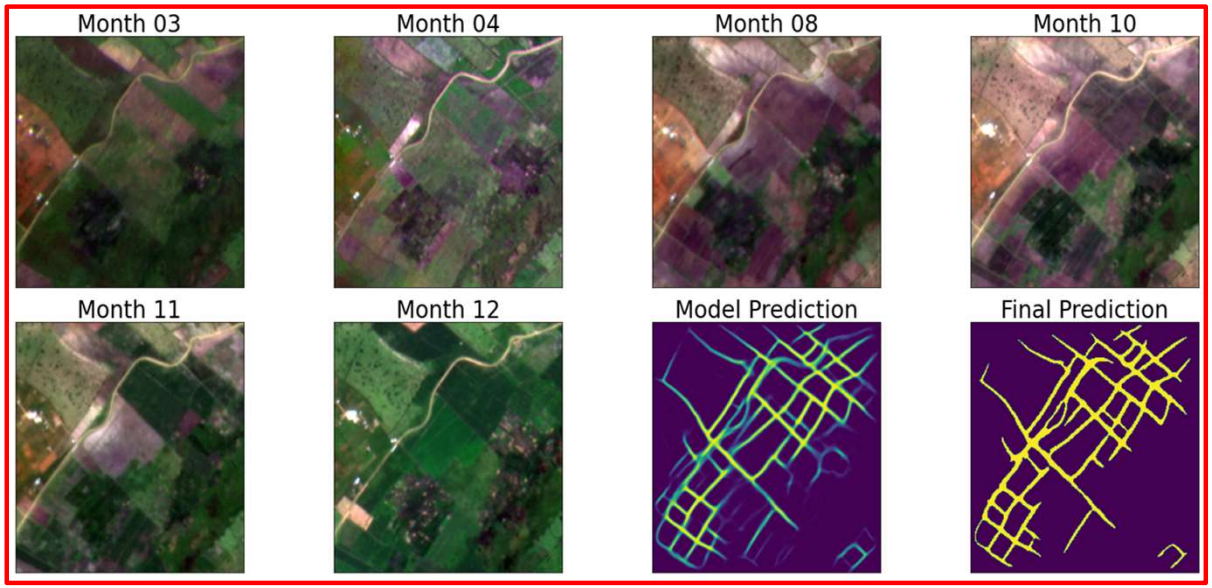
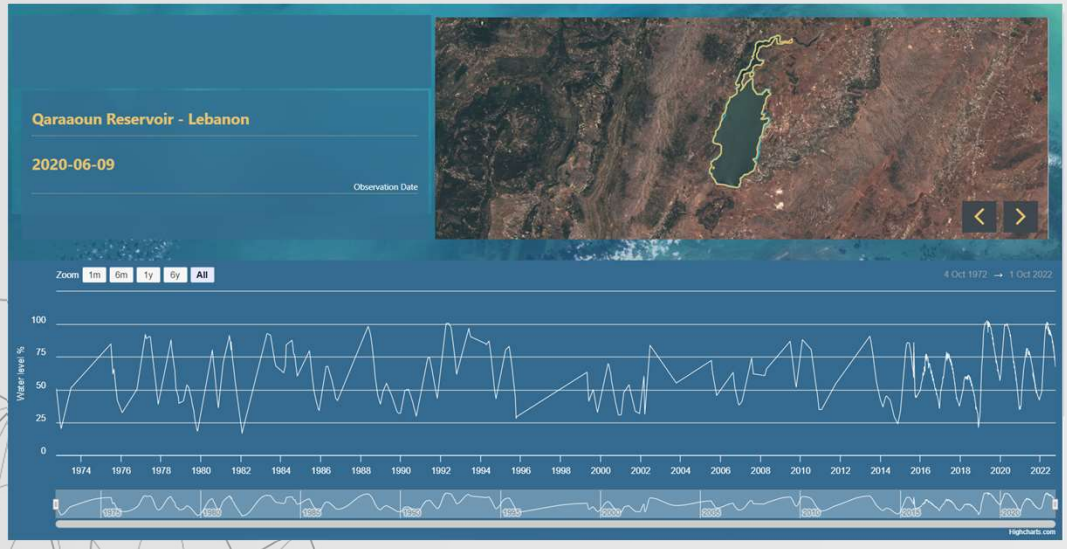
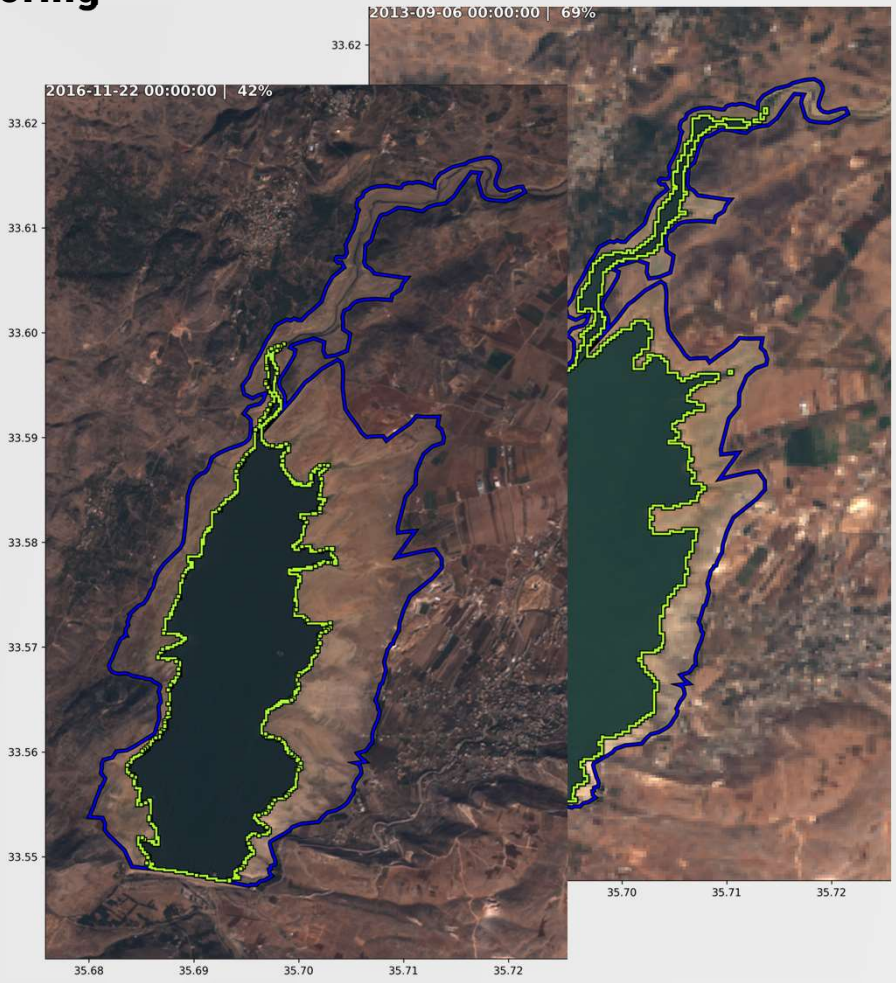


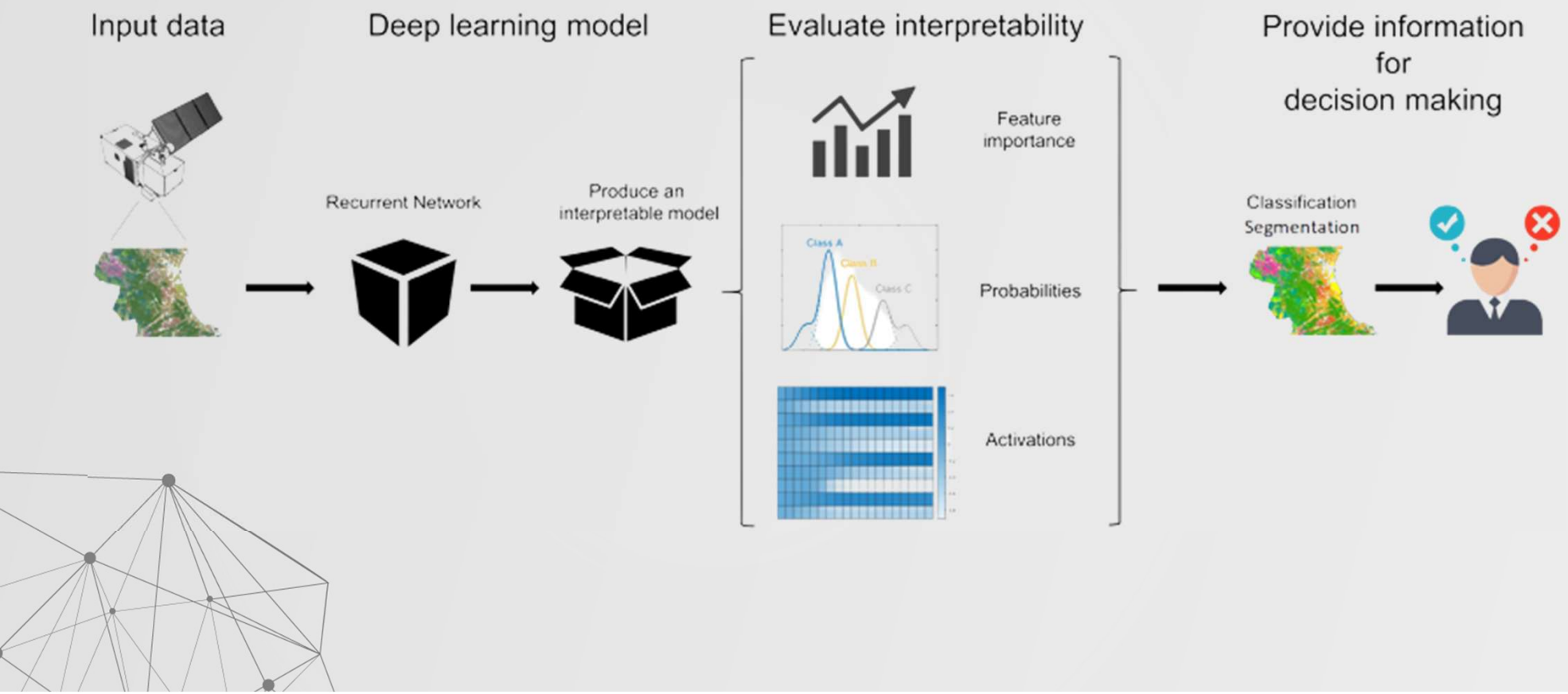
Waterbodies monitoring

- **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)

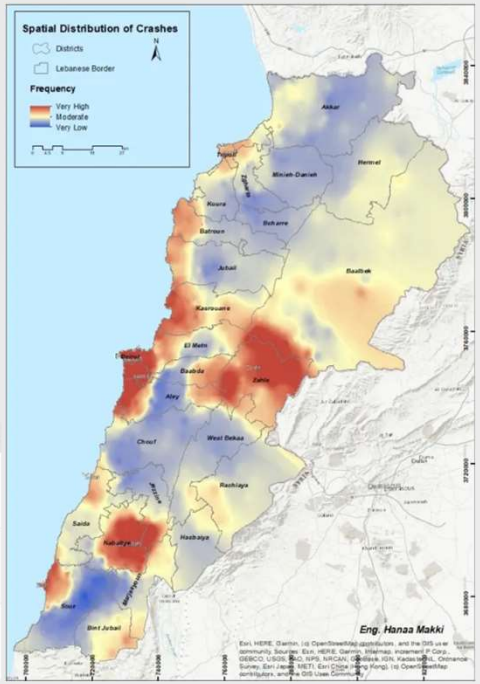


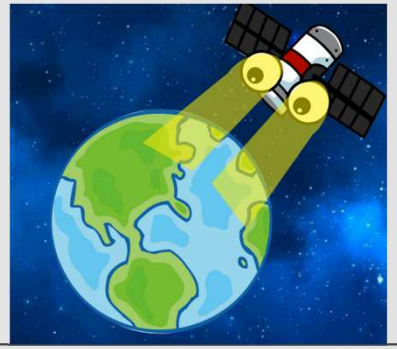
Lebanese Observatory for Crashes on Road (LOCR)

Calling API(s) to retrieve new tweets and posts on daily basis → Insert all tweets and posts in the database → NLP to identify road crashes → NLP to extract features (Injured, victims, location, type, date, image, etc)

- **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	قتيل و ١٠ جرحى جراء انقلاب باص على طريق #المصنع @LebISF @tmclebanon http://t.co/OGr8hL1kg1	Aug. 31, 2015, 5:27 a.m.	RedCrossLebanon	1
1027148830574297088	قتيل و 10 جرحى الحصيلة النهائية للحادث المروري الذي حصل على طريق عام #بشامون باتجاه #عاليه #كفاريا	Aug. 8, 2018, 2:05 p.m.	tmclebanon	1
579920311895900160	نقل #الصليب_الأحمر_اللبناني ١٠ جرحى من حادث سير في منطقة #الحازمية @tmclebanon http://t.co/xkWWARqMhB	March 23, 2015, 10:19 a.m.	RedCrossLebanon	0





Thanks

www.geogroup.ai