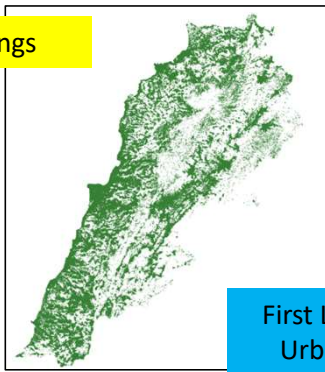# Lebanese Observatory for Crashes on Roads (LOCR)

Dr. Ali J. GHANDOUR

aghandour@cnrs.edu.lb

GEOspatial Artificial Intelligence (GEOAI) group

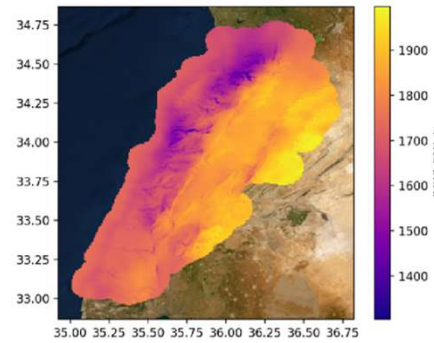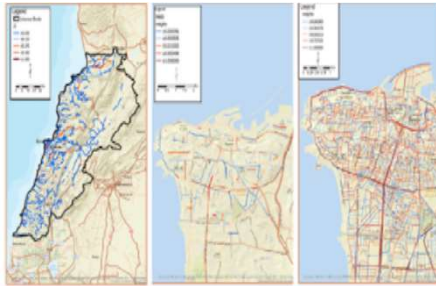**Urban-AI Mapping**

720K buildings

First Lebanese Urban Map

Solar rooftop potential map

Number of Placed Panels : 45
Solar Potential : 30.4398(MWh/year)

Crop Monitoring

Road Crashes Observatory
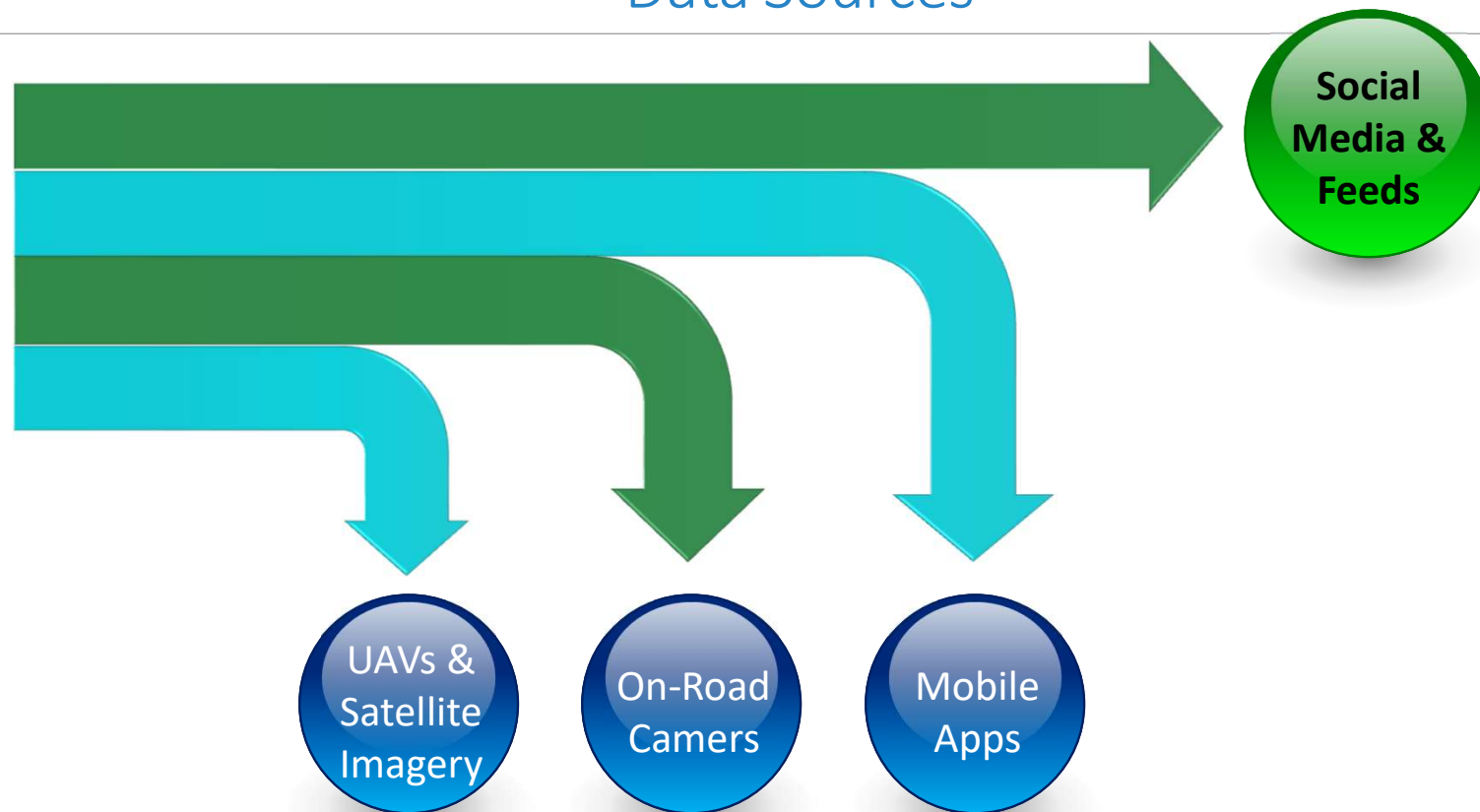
Water Body Monitoring
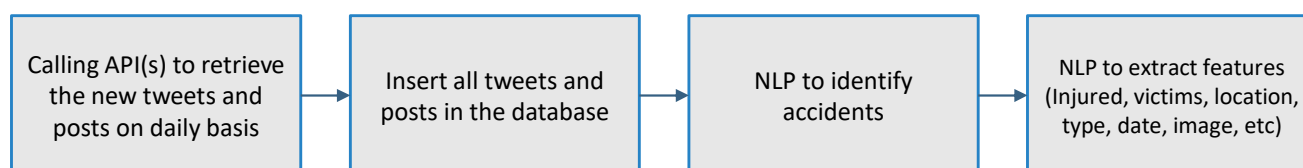
CNRS
المجلس الوطني للبحوث العلمية

Objectives

o Platform for data collection and fusion from several sources.

o Mine and analyze spatio-temporal road crashes time-series to reveal patterns, trends and correlations.

o Fine-grained data and comprehensive reporting is not an objective

o **10 Years life span: 2015-2024.**

CNRS
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Data Sources

Social Media & Feeds

UAVs & Satellite Imagery

On-Road Camers

Mobile Apps

LOCR Architecture

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

1. Thousands of coding lines done in Python

2. Continuous development and support

3. ~ 80,000 tweets & 30,000 posts processed since 2015
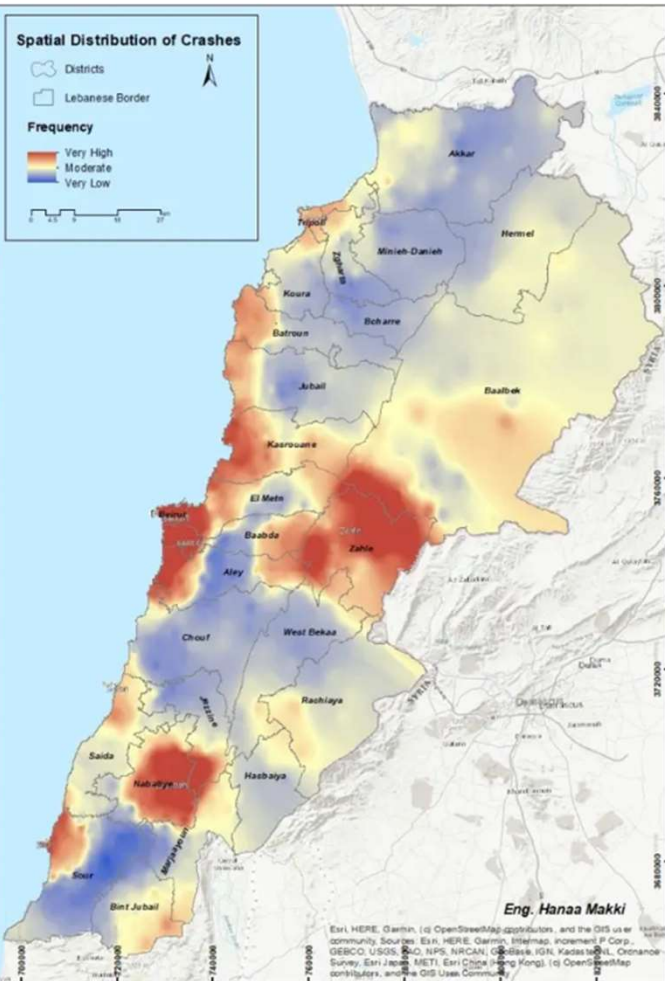
4. ~22,000 accidents as of May 2023

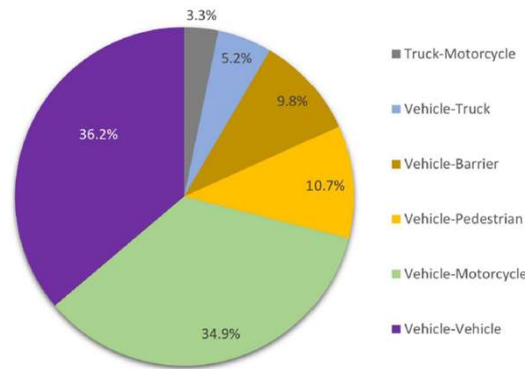| ID ACC	TEXT ACC	DATE ACC	SOURCE ACC	VICTIMNB ACC
638176137575710720	قتيل و ١٠ جرحى جراء انقلاب باص على طريق @LebISF #المصنع @tmclebanon http://t.co/OGr8hL1kg1	Aug. 31, 2015, 5:27 a.m.	RedCrossLebanon	1
1027148830574297088	قتيل و 10 جرحى الحصيله النهايه للحادث المروري الذي حصل على طريق عام #بشامون باتجاه #علده #كفانا_يقى	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

Deliverables: Yearly Report

Spatial Distribution of Crashes

Eng. Hanaa Makki

Trend Analysis of Lebanese Road Crashes in 2022

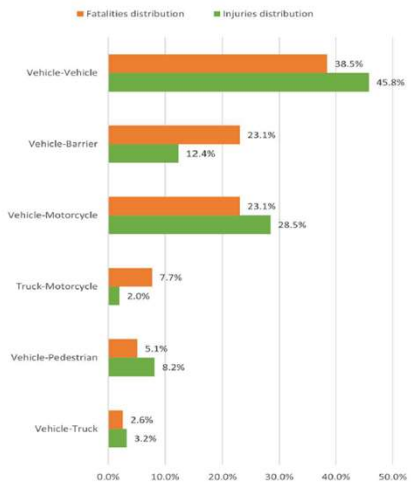National Council for Scientific Research

Road crashes in Lebanon have been harvesting lives constantly, dramatically changing others, especially the survivors who could be traumatized by the accident. In this report, we present trend analysis of Lebanese road crashes for the Year 2022 based on data collected by the Lebanese Observatory for Crashes on Road (LOCR). LOCR platform serves to collect and analyze road crash events using crowd-sourcing approach from social media (notably Twitter and Facebook). Developed by a group led by Dr Ali J. Ghandour, LOCR has been in production since 2015 at the National Center for Remote Sensing – CNRS.

Road Crashes' Type Distribution

- 3.3% Truck-Motorcycle
- 5.2% Vehicle-Truck
- 9.8% Vehicle-Barrier
- 10.7% Vehicle-Pedestrian
- 34.9% Vehicle-Motorcycle
- 36.2% Vehicle-Vehicle

Fatalities and Injuries distribution by Crash Type

Fatalities distribution / Injuries distribution

| Crash Type	Fatalities	Injuries
Vehicle-Vehicle	38.5%	45.8%
Vehicle-Barrier	23.1%	12.4%
Vehicle-Motorcycle	23.1%	28.5%
Truck-Motorcycle	7.7%	2.0%
Vehicle-Pedestrian	5.1%	8.2%
Vehicle-Truck	2.6%	3.2%

Deliverables: Analysis and Results Publications

1. Analyzing Factors Associated with Fatal Road Crashes: A Machine Learning Approach

2. Allometric scaling of road accidents using social media crowd-sourced data

3. Transportation hazard spatial analysis using crowd-sourced social network data

4. Time-clustering behavior and cycles in the time dynamics of car accident sequences in Lebanon

5. Autonomous Vehicle Detection and Classification in High Resolution Satellite Imagery

6. Spatio-Temporal Optimal Law Enforcement using Stackelberg Games

Dashboard – *ongoing work*

Transportation hazard spatial analysis

Lebanon

Beirut
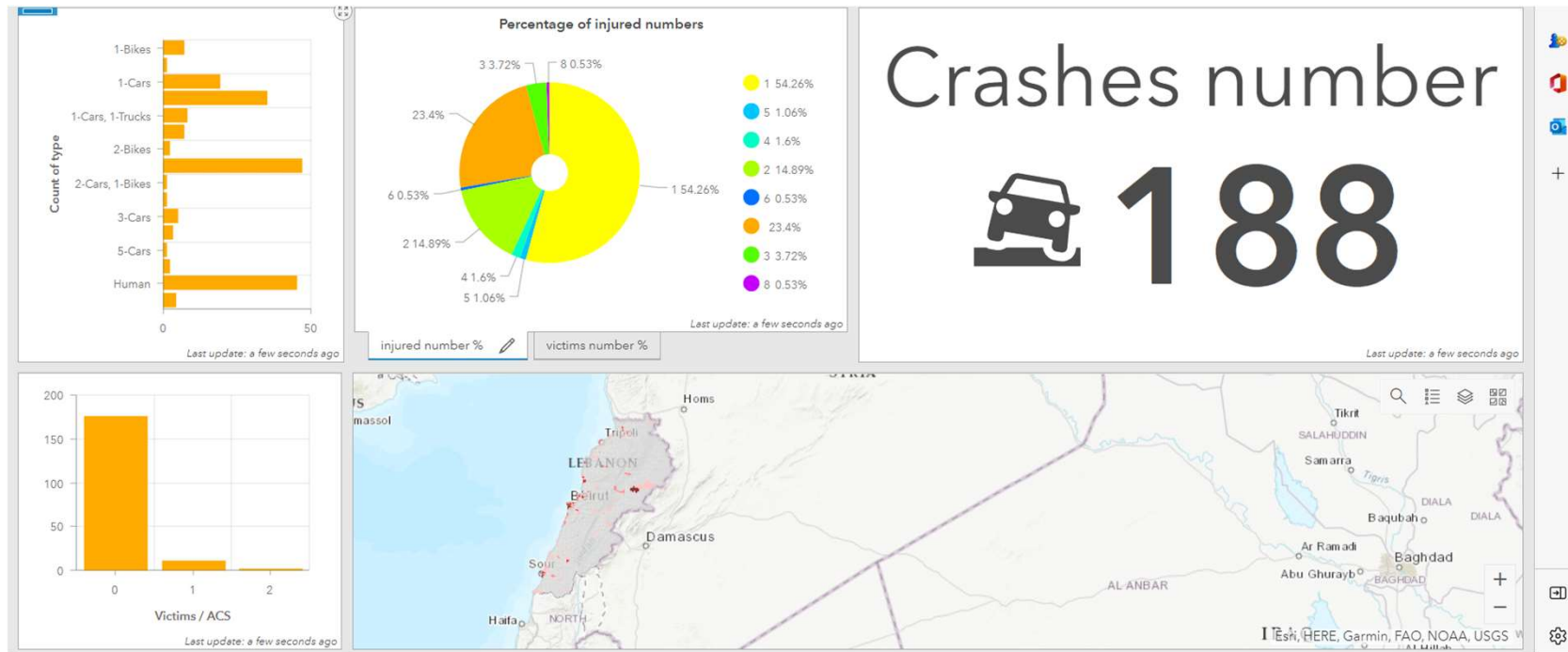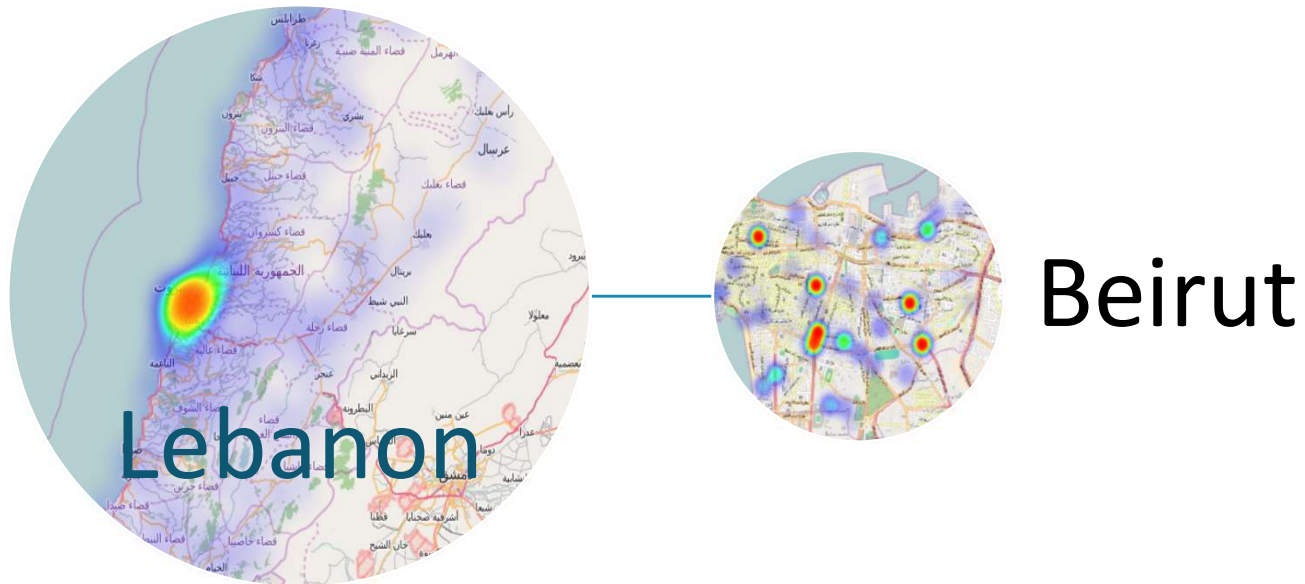
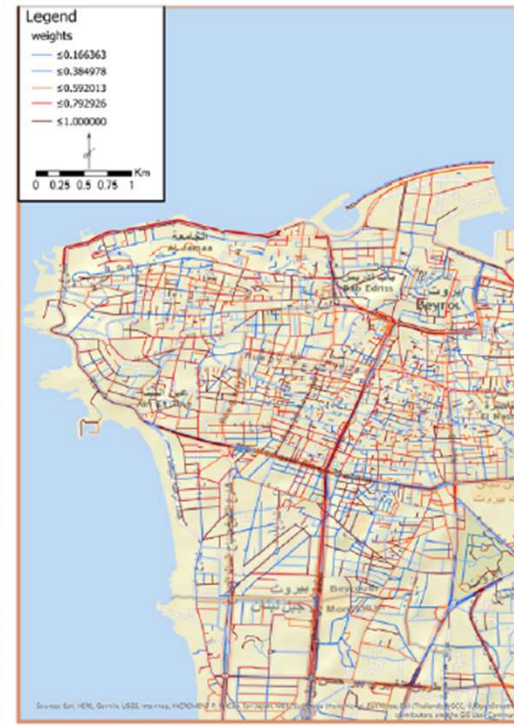# Transportation hazard spatial analysis
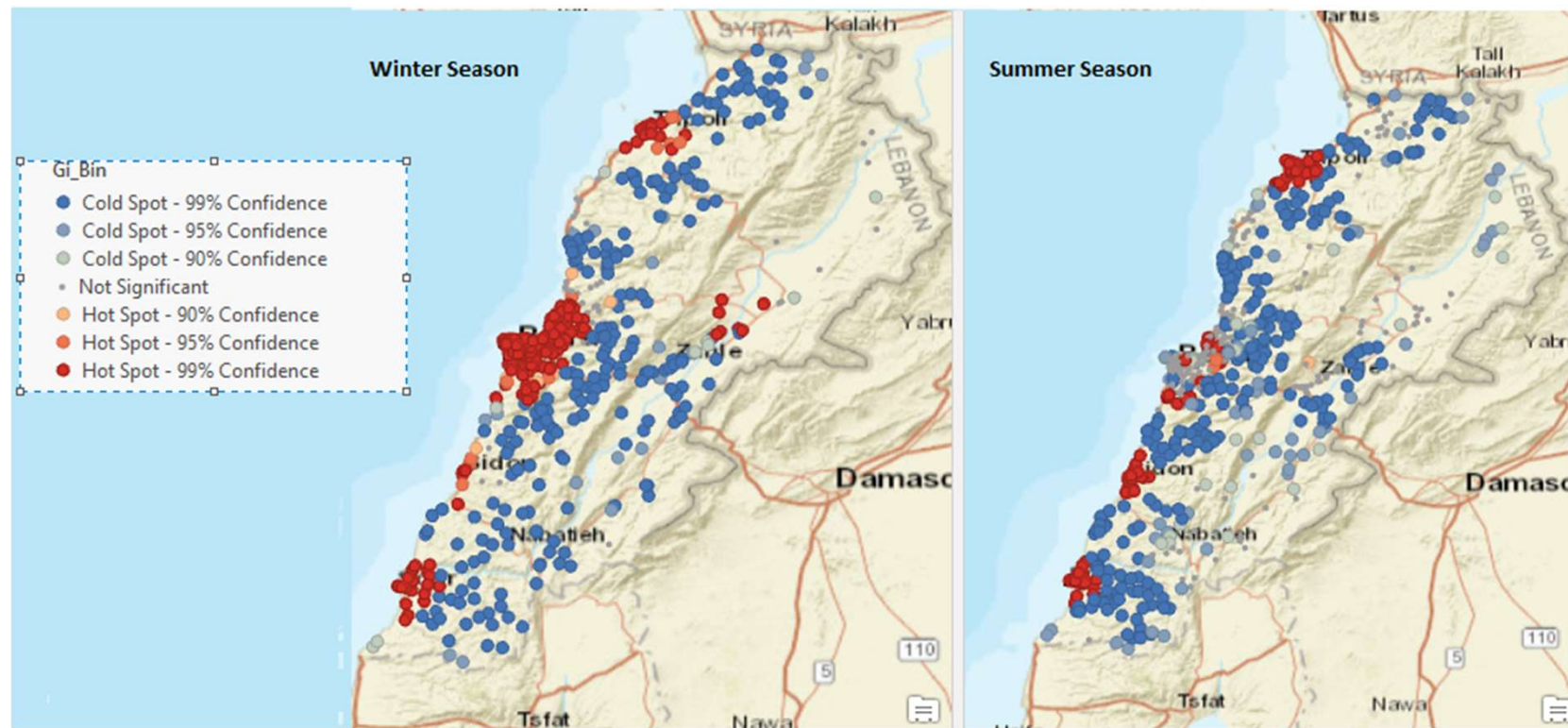
Transportation hazard spatial analysis
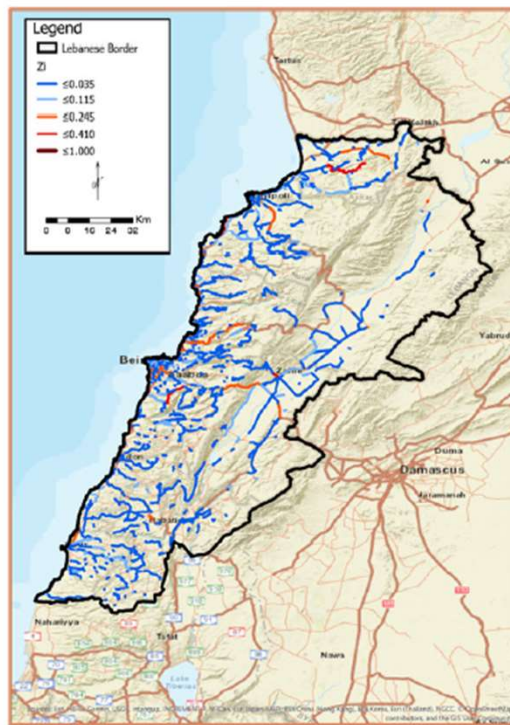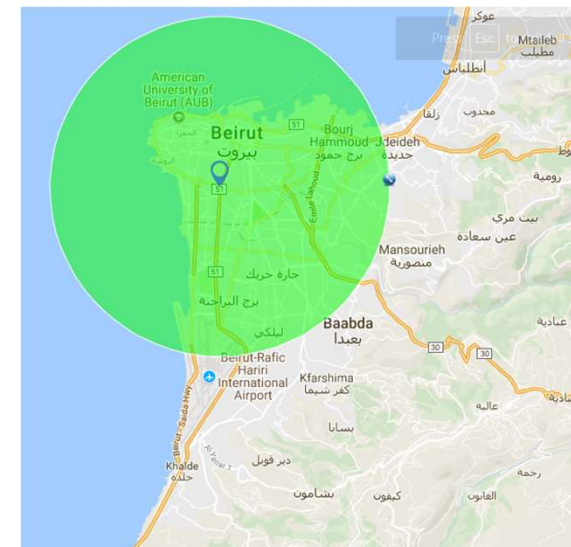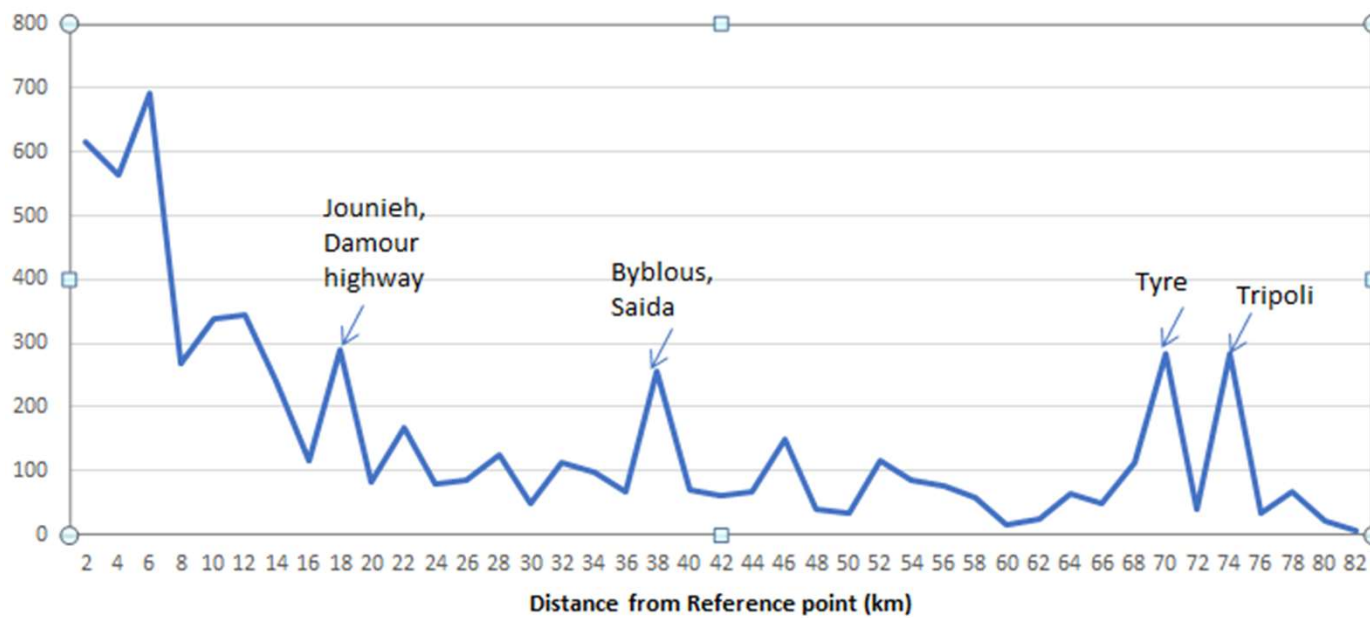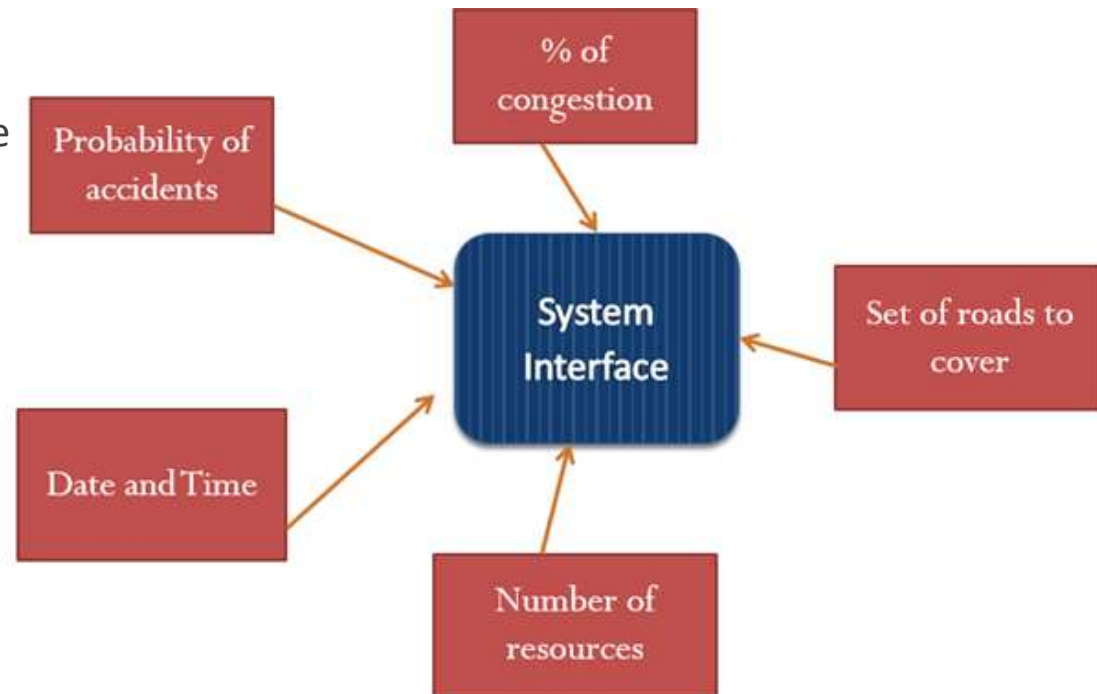

(a)   (b)   (c)

Transportation hazard spatial analysis

Optimal Speed Traps Allocation

1. Dynamic allocation of speed traps

2. Driver cannot anticipate location & time

3. Game Theory problem

4. Several variables including road crashes
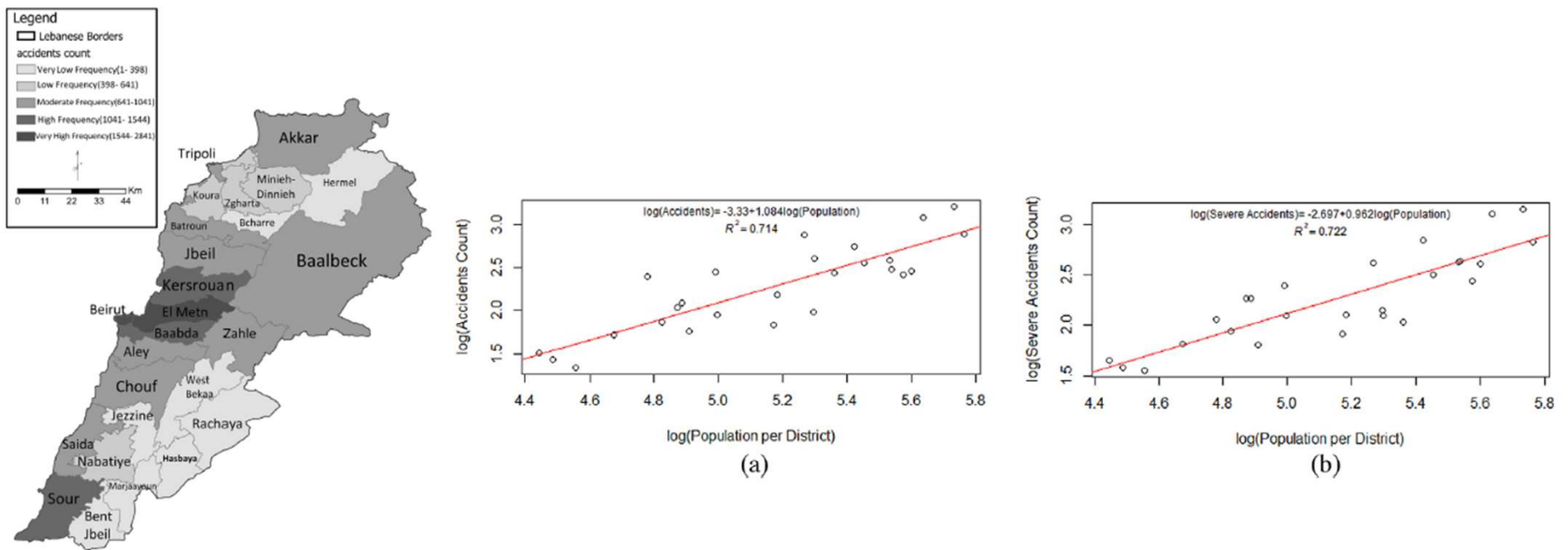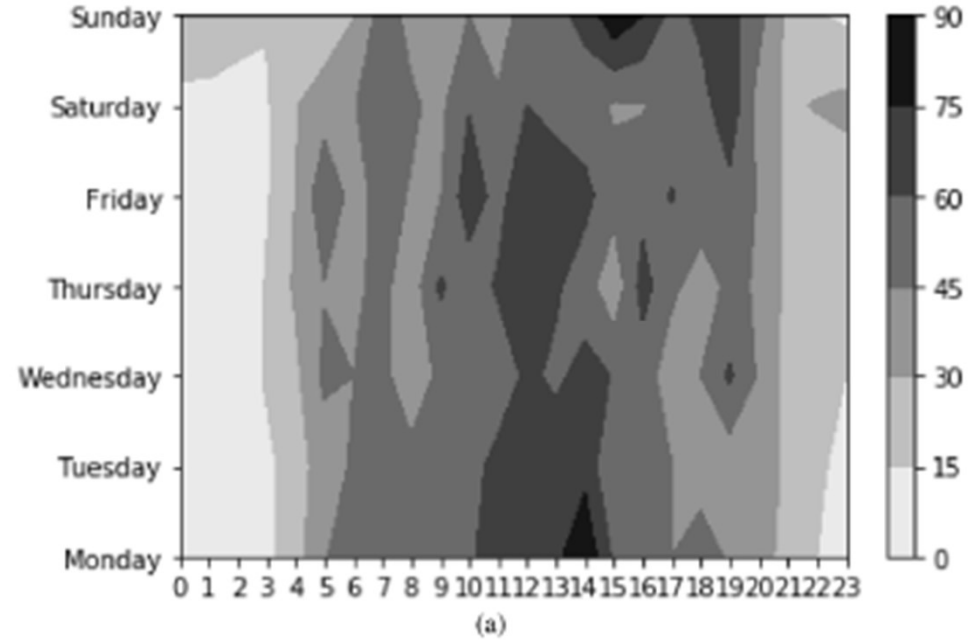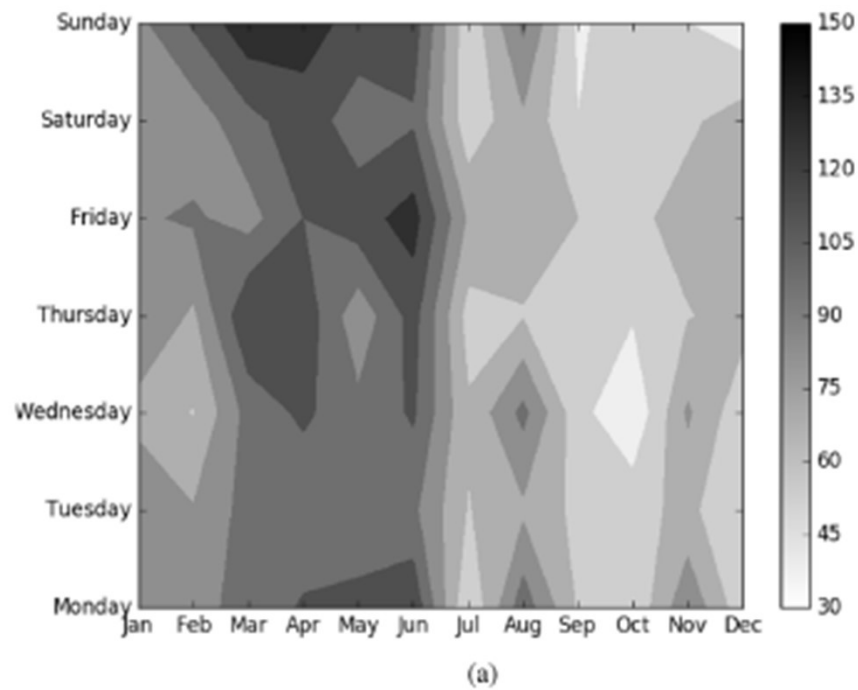
Allometric scaling of road accidents

Fig. 1. Distribution of Accident Occurrence Frequency by District [33.8547° N, 35.8623° E].

Allometric scaling of road accidents

(a)

(a)

Analyzing Factors Associated with Fatal Road Crashes

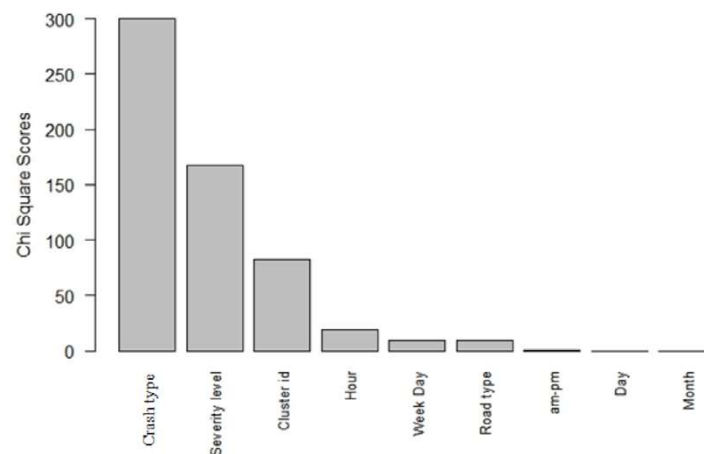| Variable	Range
Input Variables	
Month	1–12
Day	1–31
Day of the Week	Monday–Sunday
Hour of Crash	0–23
AM/PM	am, pm
Crash Type	Vehicle–Vehicle, Vehicle–Truck, Vehicle–Pedestrian, Vehicle–Motorcycle, Vehicle–Barrier, Truck–Truck, Truck–Motorcycle, Truck–Barrier, Motorcycle–Motorcycle, Motorcycle–Barrier, Other
Injury Severity Level	No Apparent-Injury, Minor Injury, Serious Injury
Road Type	Motorway, Trunk, Primary, Secondary, Tertiary, Unclassified
Spatial Cluster ID	1–10
Output Variable	
Fatality occurrence	Fatal, Not Fatal

Figure 2. Top correlated variables in order of the Chi-squared score.

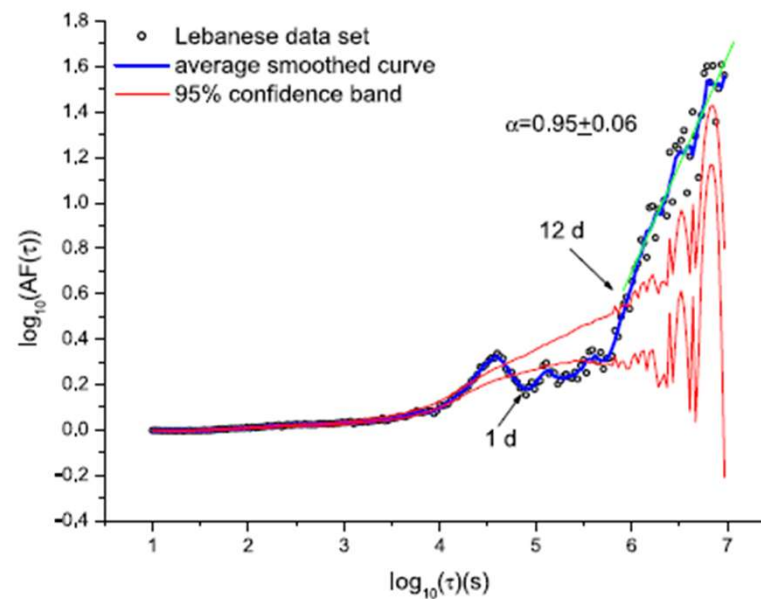# Time-clustering behavior and cycles in the time dynamics

Fig. 2. Allan Factor of the Lebanese car accident sequence from 2015 to 2018.

Autonomous Vehicle Detection and Classification

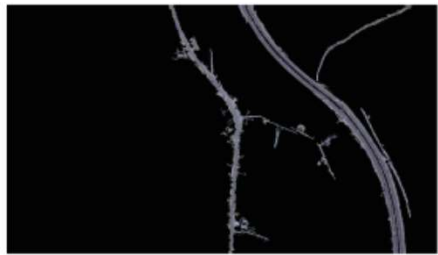
Lebanese Observatory for Crashes on Road (LOCR), GEOAI group, Dr Ali J. GHNADOUR: https://geogroup.ai/project/locr/