

Trend Analysis of Lebanese Road Crashes in 2022

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.

LOCR is the only real-time and openly available Lebanese spatio-temporal road crashes database. Events collection, classification and visualization is done autonomously, without any human intervention, by employing Natural Language Processing (NLP) techniques. Fine-grained data and comprehensive reporting is not the objective of this work, but rather LOCR serves to mine and analyze spatio-temporal road crashes trends using representative time-series. The data collected from this work has proven itself to be credible as it has been used in multiple research projects so far as shown in the below link: <https://geogroup.ai/project/locr/>

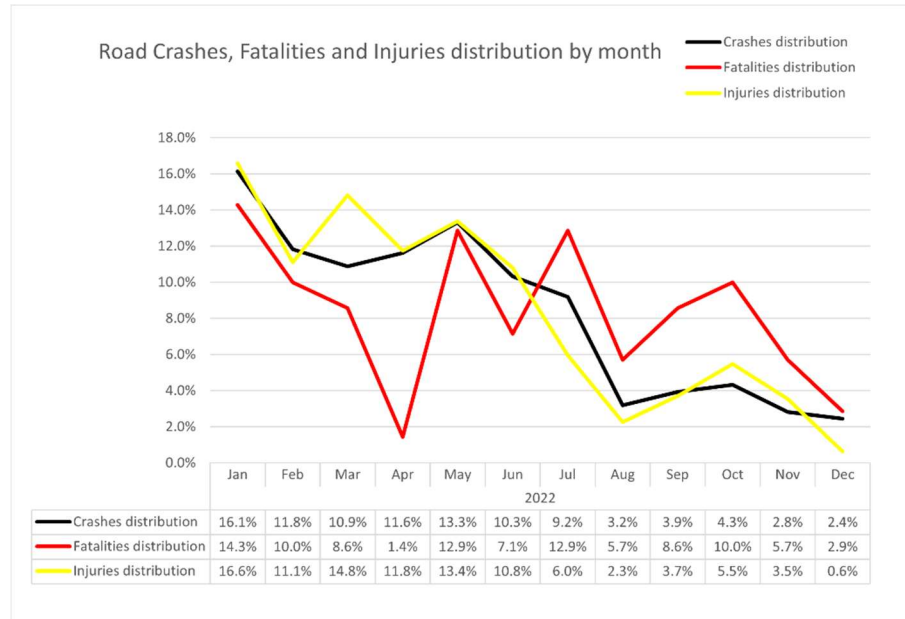
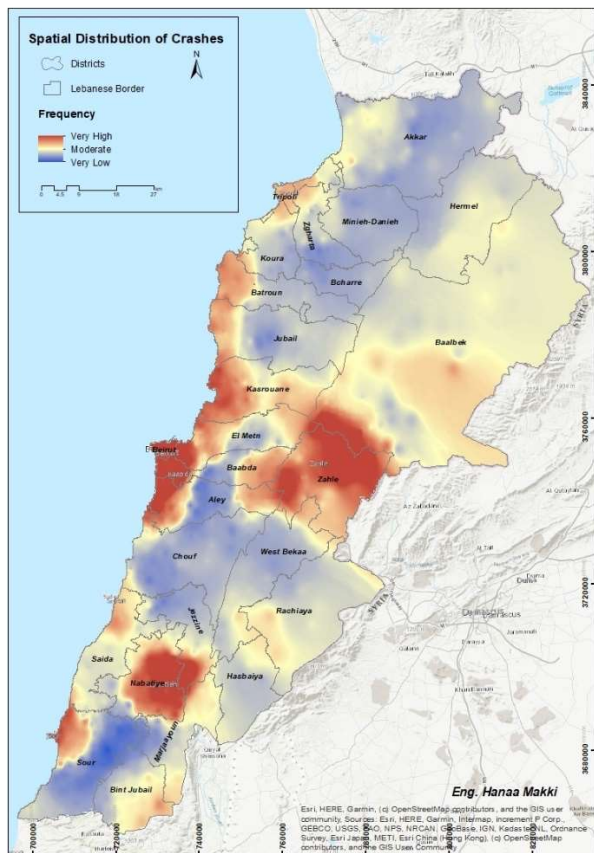


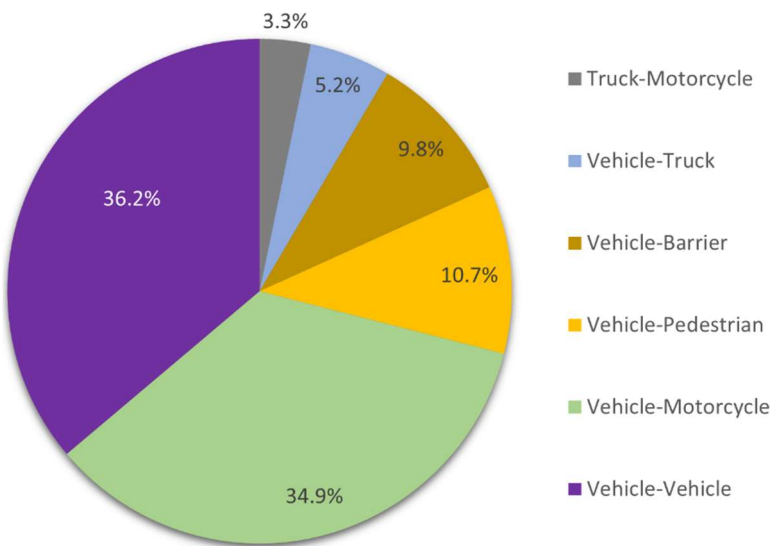
Figure 1: (a) Spatial heatmap of road crashes and (b) Temporal distribution of road crashes, fatalities and injuries per month for the Year 2022 in Lebanon.



In Figure 1(a), we present hot-spot analysis of Lebanese road crashes locations in the Year 2022. Three main regions exhibit high risk of road crashes, mainly Greater Beirut Area, Nabatieh and Zahle districts. In fact, road crashes are mainly clustered towards the coastal line such as in Jounieh, Batroun, Tripoli, Byblos and Tyre. This is aligned with research results reported in [2][3] where road crashes allometric scaling with city expansion is interpreted as a living organism. Coastal cities, connected to the major roads in Lebanon, are seen as the main arteries where most urban activities take place and thus witness high traffic volume. This hotspot trend analysis is crucial for stakeholders and decision makers while laying down appropriate strategies and measures for road crashes prevention. Law enforcement agencies can rely on it too for optimal deployment of speed radar as shown in [5].

In Figure 1(b), temporal distribution for road crashes, fatalities and injuries per month during 2022 is analyzed. The black line representing road crashes distribution per month shows a negative slope where crashes occurrence is sharply reduced during the summer season. This does not come as a surprise since previous studies, mainly [3], have revealed that winter season has the highest crashes concentration. This can be attributed to several factors such as weather conditions, bad road conditions during winter season and high traffic volume around schools and universities.

Road Crashes' Type Distribution



Fatalities and Injuries distribution by Crash Type

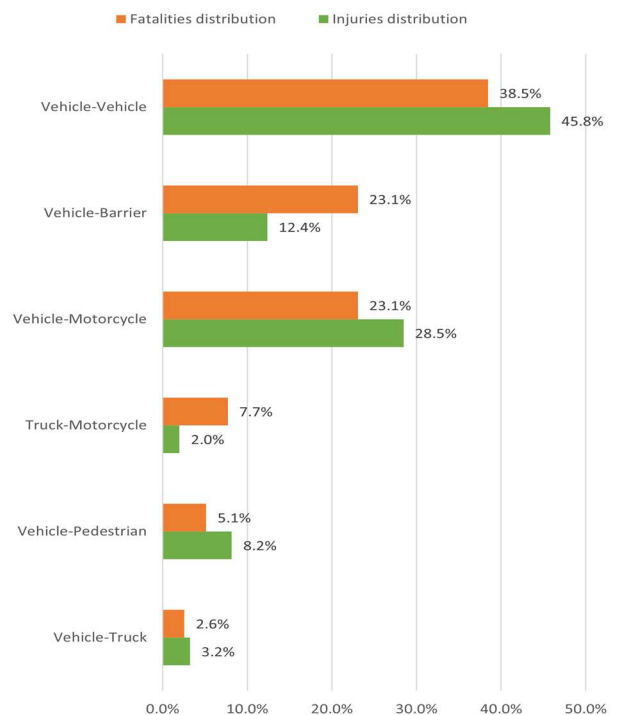


Figure 2: (a) Road crashes' type distribution per category and (b) Distribution of fatalities and injuries by road crash type for the Year 2022 in Lebanon.



Figure 2(a) reveals that the largest percentage of crashes is of type Vehicle-Vehicle, while Vehicle-Motorcycle and Vehicle-Pedestrian ranks second and third with 34.9% and 10.7%, respectively. This trend analysis of road crashes involved parties is very useful to understand the risk factors contributing to fatal injuries, analogous to work presented in [1].

Special thanks go to Eng. Hanaa Makki for preparing this 2022 Report and Eng. Mohamad Dimassi for continuous technical development and support of the LOCR platform.

References:

- [J01] Ali J. Ghandour, Huda Hammoud and Samar El Hajj, “Analyzing Factors Associated with Fatal Road Crashes: A Machine Learning Approach”, in International Journal of Environmental Research and Public Health.
- [J02] Ali J. Ghandour, Huda Hammoud, Mohammad Dimassi, Houssam Krayem, Jamal haydar and Adam Issa, “Allometric Scaling of Road Accidents using Social Media Crowd-sourced Data”, Elsevier Physica A: Statistical Mechanics and its Applications, Vol. 545, May 2020
- [J03] Ali J. Ghandour, Huda Hammoud and Luciano Telesca, “Transportation Hazard Spatial Analysis using Crowd-sourced Social Network Data”, Elsevier Physica A: Statistical Mechanics and its Applications, Vol. 520, pp. 309-316, 2019.
- [J04] Ali J. Ghandour, Luciano Telesca and Michele Lovallo, “Time-clustering behavior and cycles in the time dynamics of car accident sequences in Lebanon”, Elsevier Physica A: Statistical Mechanics and its Applications, Vol. 516, pp. 178-184, 2019.
- [J05] Rola Naja, Nadia Mouawad and Ali J. Ghandour, “Spatio-Temporal Optimal Law Enforcement Using Stackelberg Games”, Lebanese Science Journal, Vol. 18, No.2, 2017.