ABI Telematic Geospatial Data Science Project

(Trial phase and Simulation)

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Agenda

1. Scope of project
2. Timeline
3. Analysis Environment
4. Solution (Trial phase)
5. Decision for Next Step

Scope of Project

1. This project use the virtual(making) telematic data, generate for analysis, visualize and simulate the formular that "prompt" to apply with real telematic data on the implement phase.

2. Outcome from this project are :
    2.1 Accidental Map
        - Visualize the Low-High accident area on GIS maps.
    2.2 Accidental probability formular (The second phase -> need real data)
        - The formular for accident probability projection on the area has high chance to accident occurred calculated with multiple regression, and we also know the co-relation between each factor to accident occurred and severity.

(*As the accident map result can apply with telematic equipment to alert driver when drive into hazard area and for the formular, we will know what factor has high co-relation to claim occurred and find the prevent the road accident as CSVxDX)

Project Timeline

Phase	Geospatial (Data Science) analysis	PIC	Oct				Nov				Implement Phase (2 Months)							
			W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
1 - Planning Phase	**Pilot Project Planning** - Specify required data, data sources, methods and appropriate data science tools.	CP																
2 - Trial Phase	**Data Analysis** Geospatial analysis the telematic data and visualize to accidental map	CP																
	Management decision (Hold / Implement)																	
3 - Implement Phase	**Data Gathering** -Gathering internal and external required data	CP																
	Data Analysis - Updated data with real telematic data	CP																
	Summary -Deliver the solution (The accidental map and the propability formular)	CP																

Analysis Environment

1. Tools: Power BI, (Python) Jupiter notebook for data scientists

2. Telematic data (dummy for this trial phase) ; with 50,000 transactions as follow :
   2.1 Random data in Bangkok and surrounding, Scope area by Latitude and Longitude
   2.2 Random 3 Types of G-Force (Acceleration, Breaking, Cornering)
   2.3 Random other factor related the telematic data

The Example of dummy telematic data to analysis for the simulation

	A	B	C	D	E	F	G	H	I	J	K	L
1	Date	Vehicle ID	Number	G-Force	Latitude	Longitude	Speed	Fuel Level	Temperatu	Engine Sta	ClaimAm	Time accid
2	04-08-22	1	1	8.1	13.7597	100.5937	59	67	24	Stopped	1,973	4:50:40
3	16-02-22	9	2	1.93	13.701	100.5656	52	87	17	Running	37,028	0:32:34
4	20-07-22	7	1	0.21	13.6122	100.5789	56	78	25	Running	47,372	4:58:54
5	27-11-22	5	1	8.27	13.9385	100.6644	77	75	19	Stopped	31,691	4:27:56
6	24-10-22	2	2	7.31	13.9036	100.5479	52	73	27	Stopped	95,687	18:15:48
7	28-09-22	9	1	1.15	13.8761	100.6662	78	85	25	Stopped	6,708	6:40:28
8	27-07-22	3	1	0.29	13.7813	100.6021	52	82	25	Stopped	84,046	0:41:38
9	22-10-22	6	2	7.15	13.9296	100.5821	61	88	27	Running	81,830	5:51:10
10	01-09-22	3	3	8.9	13.6162	100.7119	75	90	18	Running	41,242	18:36:03

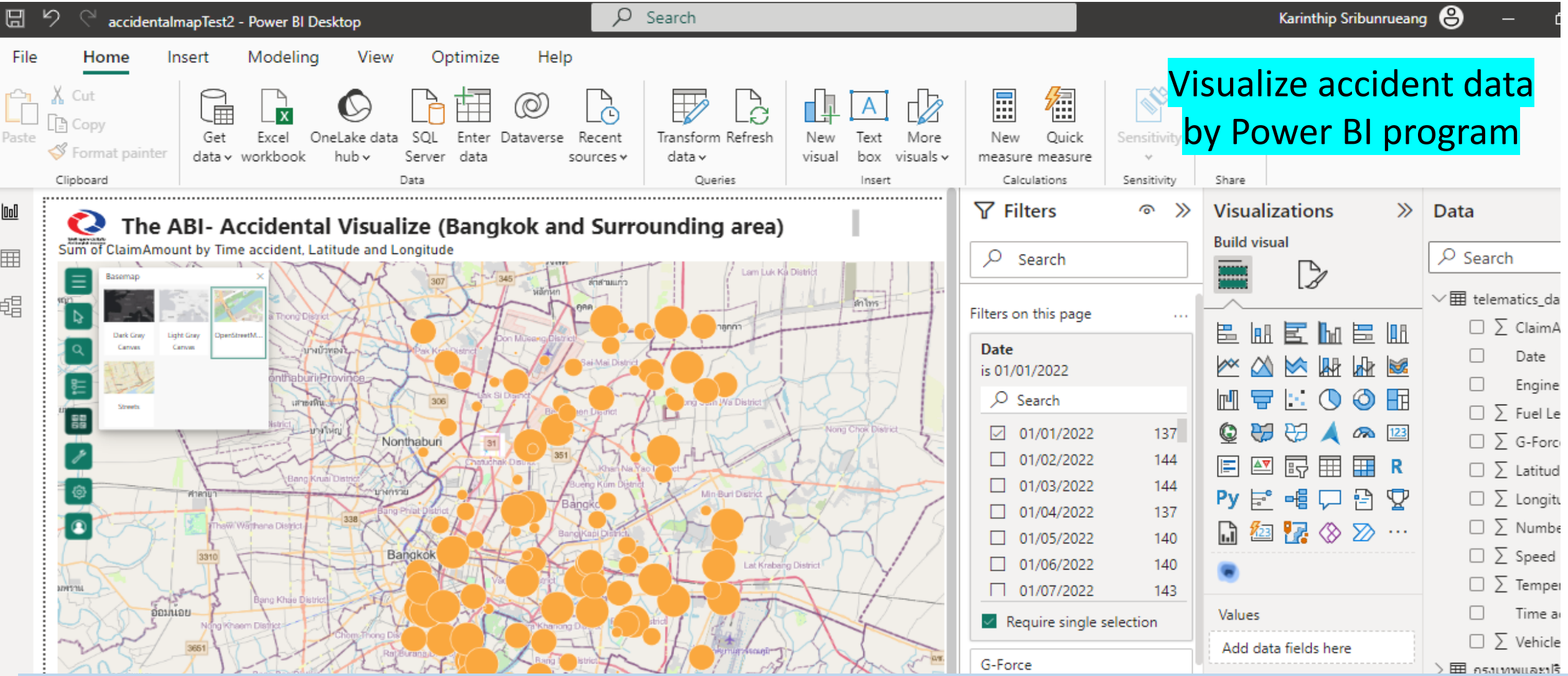
Note*
If received the real telematic data, we can wrapping data and replace BI tools with the real one immediately.

The Solution
(Trial Phase)

Note

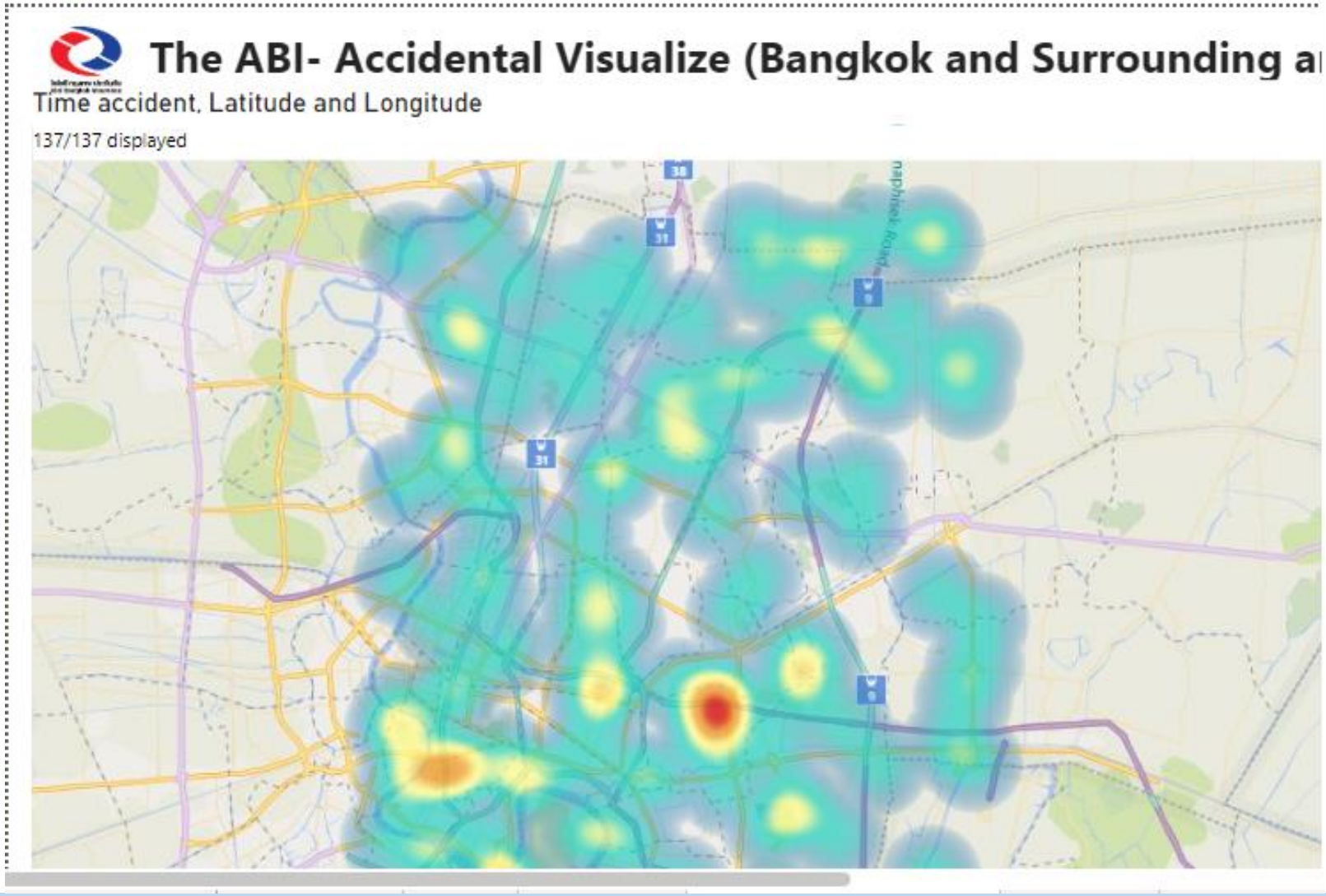
Because the PowerBI program in office's notebook not the lasted version (can't open file), so I will present the project on this power point.

Visualize accident data by Power BI program



As the Solution, we will see which area has high /low density of accident (Claim) and this visualize can filter to find the impact by different factor such as Date / Time / Place nearby* related to the frequency of accident or not. Finally, the knowledge from this results may use to plan the optimize number of surveyor staff in each area for each time-period to save cost or we can co-operate with related organization to find the root cause of accident in the high density of claim area reduce the accident in the future [CSVxDX]

*Place nearby for the next phase because need the real data to analyze



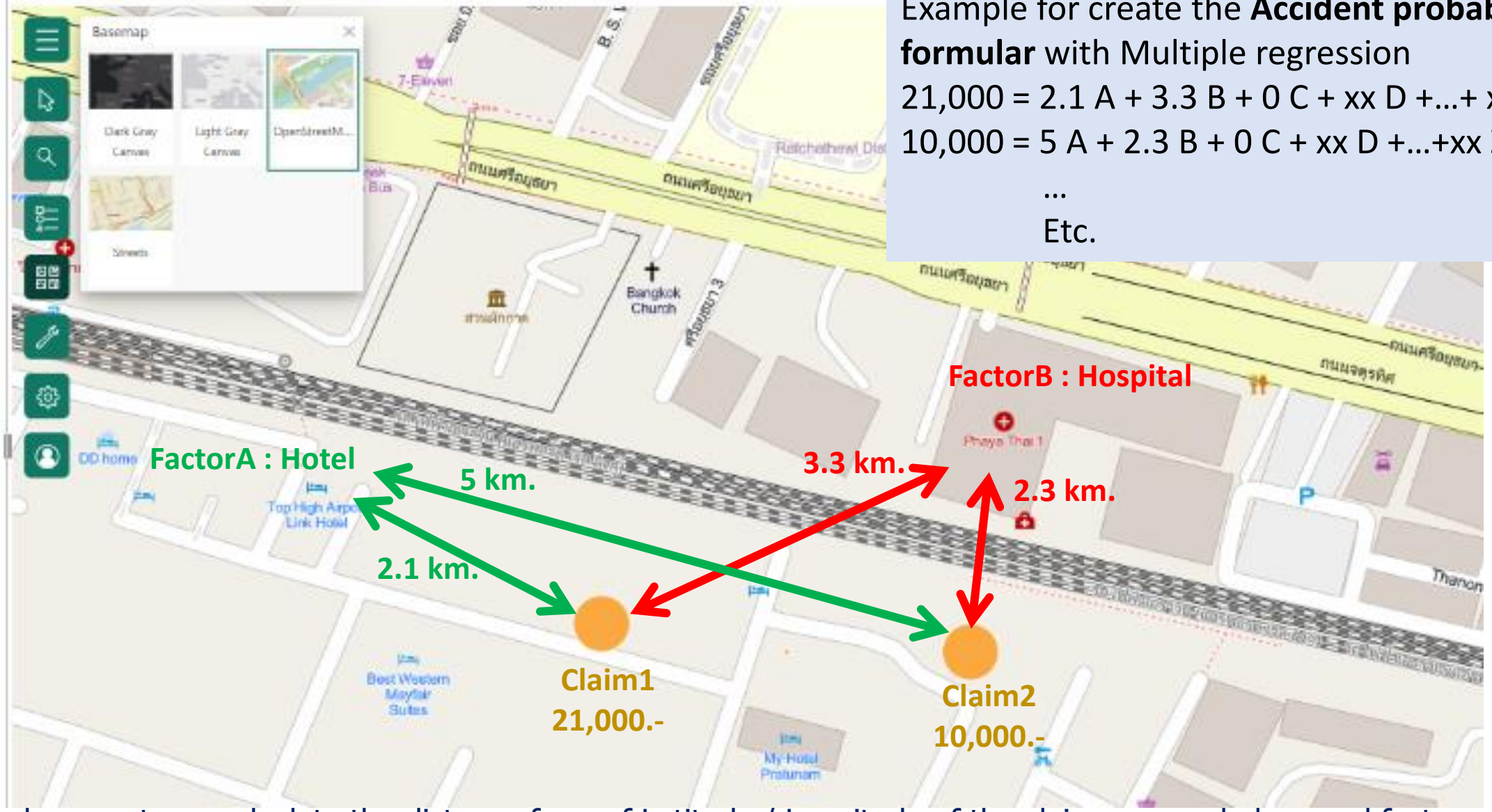
Heat map show the density of area with high accident
(Info. of the past).

(After we analyze the accidental probability formular, we can use it to predict the area with high probability to have the accident
(Info. of the future)

The accident area can visualize by heat map, we can connect the telematic technology to alert the driver when drive through high hazard area. Moreover, we can find what's type of driving (G-Force) and How it related to probability of accident (such as High acceleration >= 6.0 more than 3 second minute) so %chance of accident will increase 0.5 – 1.2% (For Dummy). This is the another way to find the root cause of accident based on telematic data.

The ABI- Accidental Visualize (Bangkok and Surrounding area)

Sum of ClaimAmount by Time accident, Latitude and Longitude



Example for create the **Accident probability formular** with Multiple regression

21,000 = 2.1 A + 3.3 B + 0 C + xx D +...+ xx Z

10,000 = 5 A + 2.3 B + 0 C + xx D +...+xx Z

...

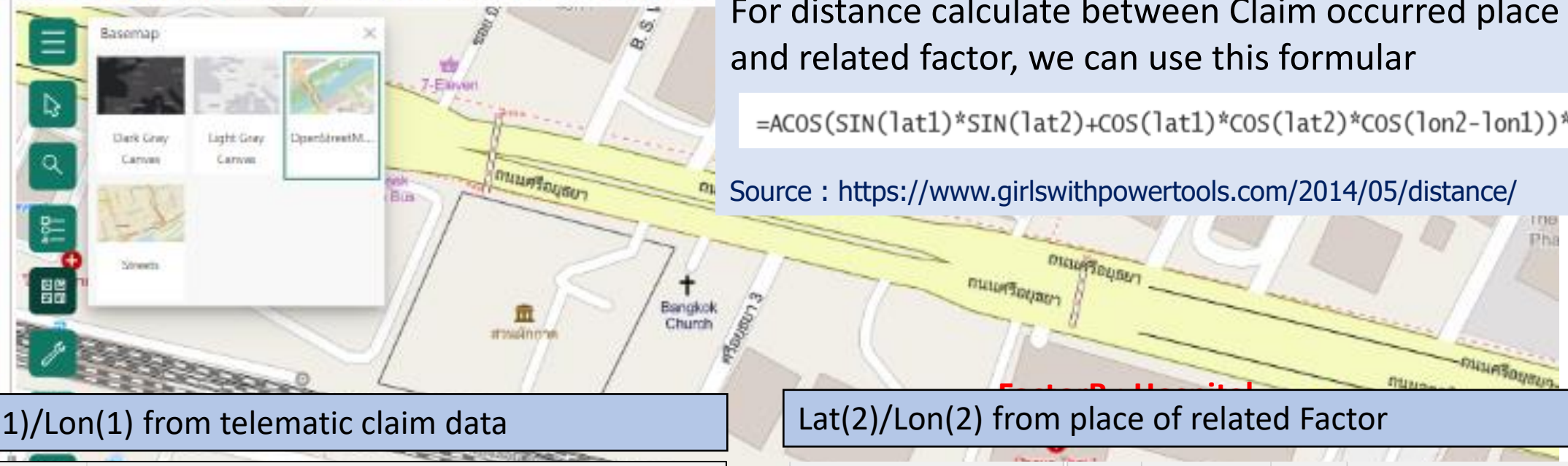
Etc.

Note

The displacement can calculate the distance from of Latitude / Longitude of the claim occurred place and factor point

The ABI- Accidental Visualize (Bangkok and Surrounding area)

Sum of ClaimAmount by Time accident, Latitude and Longitude



For distance calculate between Claim occurred place and related factor, we can use this formular

```
=ACOS(SIN(lat1)*SIN(lat2)+COS(lat1)*COS(lat2)*COS(lon2-lon1))*3959
```

Source : https://www.girlswithpowertools.com/2014/05/distance/

Lat(1)/Lon(1) from telematic claim data

Queries [2]

telematics_data

กรุงเทพและปริมณฑล

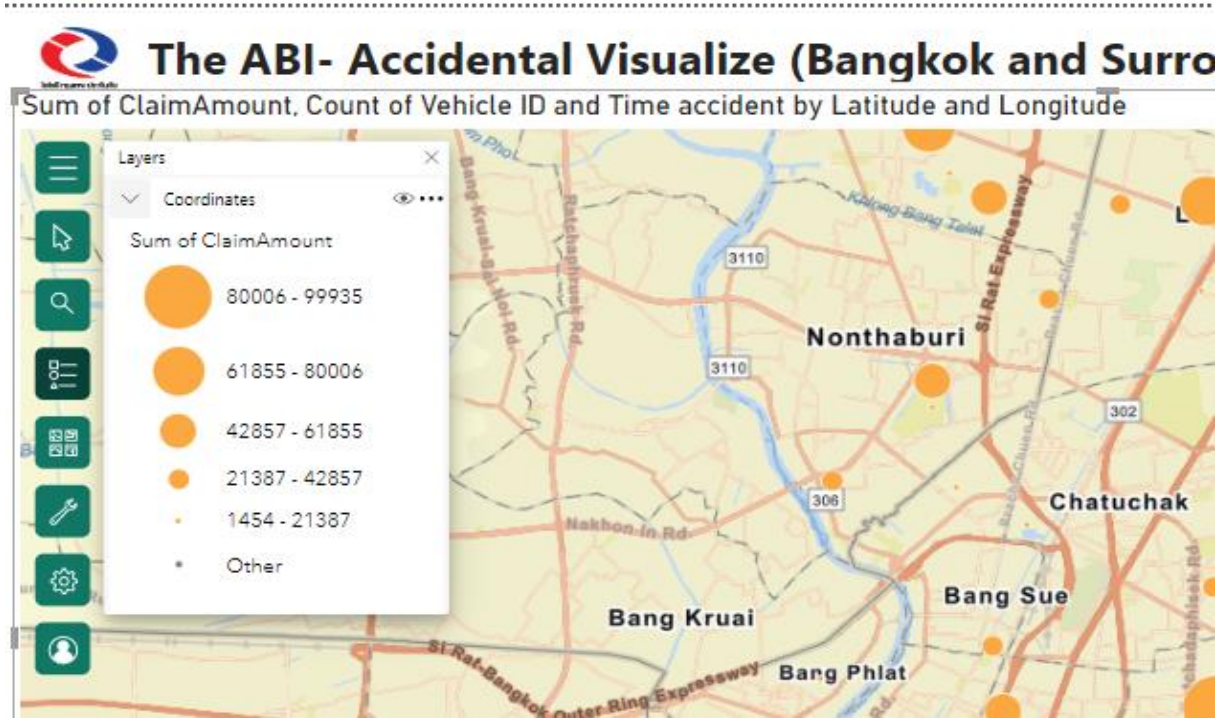
```
= Table.ReorderColumns(#"Changed Type",{"Date", "Vehicle ID", "Number", "G-Force", "Lati
```

	1.2 G-Force	1.2 Latitude	1.2 Longitude	1²3 ClaimAmount
1	8.1	13.7597	100.5937	1973
2	1.93	13.701	100.5656	37028
3	0.21	13.6122	100.5789	47372
4	8.27	13.9385	100.6644	31691
5	7.31	13.9036	100.5479	95687
6	1.15	13.8761	100.6662	6708
7	0.29	13.7813	100.6021	84046

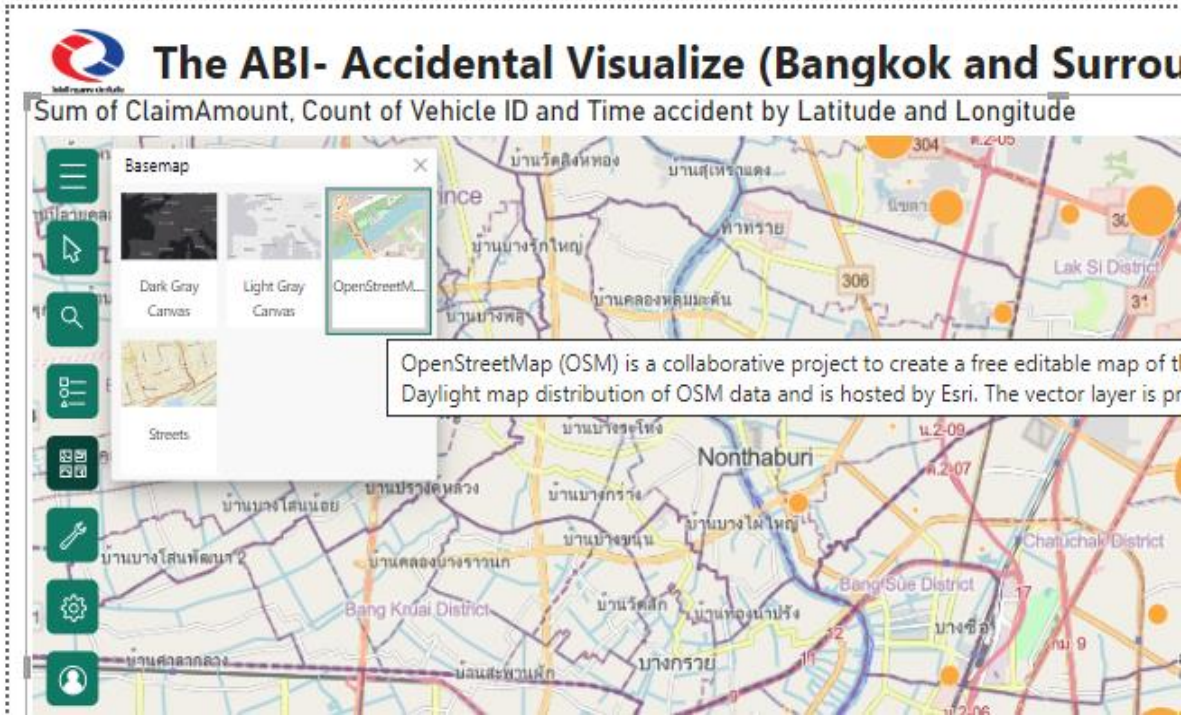
Lat(2)/Lon(2) from place of related Factor

D	G	H	I	J
ชื่อสถานพยาบาล	อำเภอ	จังหวัด	รหัสไปรษณีย์	latitude, longitude
โรงพยาบาลกรุงเทพ	ห้วยขวาง	กรุงเทพมหานคร	10320	13.748881767783306, 100.58415374411827
โรงพยาบาลกรุงเทพคริสเตียน	บางรัก	กรุงเทพมหานคร	10500	13.7285576363981, 100.5315902227
คณะแพทยศาสตร์วชิรพยาบาล มหาวิทยาลัยนวมิ	วชิรพยาบาล	กรุงเทพมหานคร	10300	13.78140170639061, 100.50884114263769
โรงพยาบาลกล้วยน้ำไท 1	คลองเตย	กรุงเทพมหานคร	10110	13.714314440531602, 100.58759267629188
โรงพยาบาลกล้วยน้ำไท 2	บางนา	กรุงเทพมหานคร	10260	13.6775923154797, 100.6069490748075
โรงพยาบาลเกษมราษฎร์ รามคำแหง	สะพานสูง	กรุงเทพมหานคร	10240	13.779746828952785, 100.677751726122
โรงพยาบาลเกษมราษฎร์บางแค	บางแค	กรุงเทพมหานคร	10160	13.7107308658407, 100.398890091992

Another useful function on this analysis (Example)

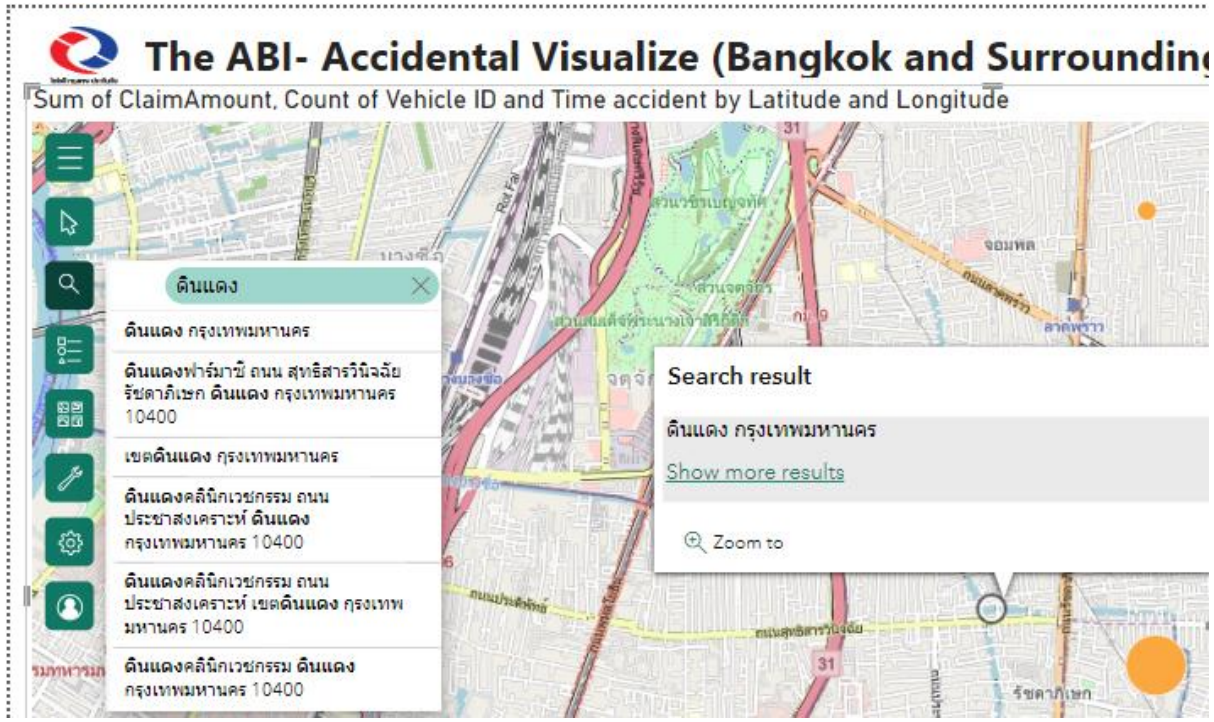


Visualize to find some insight such as which area in Thailand has high severity claim

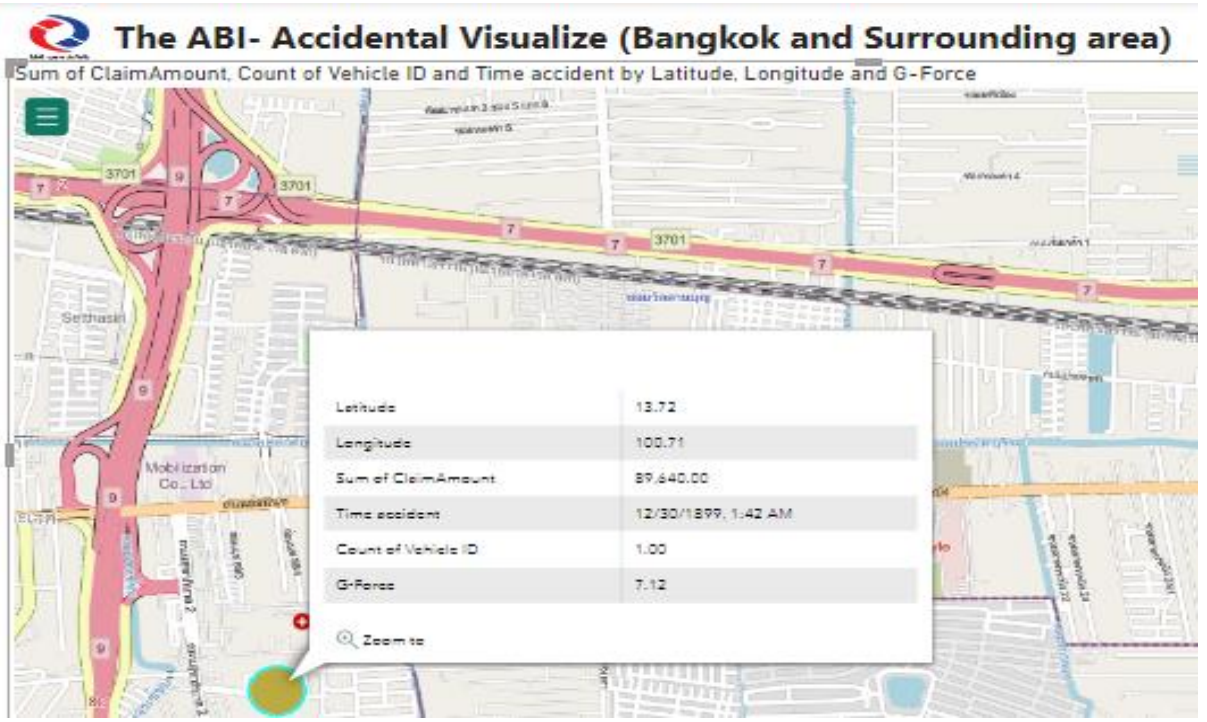


Change type of based map (Geography/ OpenstreetMap/ Else) or change the map type to suitable with each analysis (such as Heat map) or filter for some factor monitor

Another useful function on this analysis (Example)



Find the claim by search the focus area



Claim detail information by click

Thank you

Note
Power BI version Release:
September 2023

Product Version:
2.121.903.0 (23.09) (x64)

Performance Trace Logs:
C:\Users\Karinthip\AppData\Local\Microsoft\Power BI Desktop\PerformanceTraces.zip

```
section Section1;

shared telematics_data = let
    Source = Csv.Document(File.Contents("D:\04 ABI\10 DataScience_Project\Data\RandomLossLocation\telematics_data.csv"),[Delimiter=",", Columns=12, Encoding=1252, QuoteStyle=QuoteStyle.None]),
    #"Promoted Headers" = Table.PromoteHeaders(Source, [PromoteAllScalars=true]),
    #"Changed Type" = Table.TransformColumnTypes(#"Promoted Headers",{{"Date", type text}, {"Vehicle ID", Int64.Type}, {"Number", Int64.Type}, {"G-Force", type number}, {"Latitude", type number}, {"Longitude", type number}, {"Speed", Int64.Type}, {"Fuel Level", Int64.Type}, {"Temperature", Int64.Type}, {"Engine Status", type text}, {"ClaimAmount", Int64.Type}, {"Time accident", type time}}),
    #"Reordered Columns" = Table.ReorderColumns(#"Changed Type",{"Date", "Vehicle ID", "Number", "G-Force", "Latitude", "Longitude", "ClaimAmount", "Speed", "Fuel Level", "Temperature", "Engine Status", "Time accident"})
in
    #"Reordered Columns";
```