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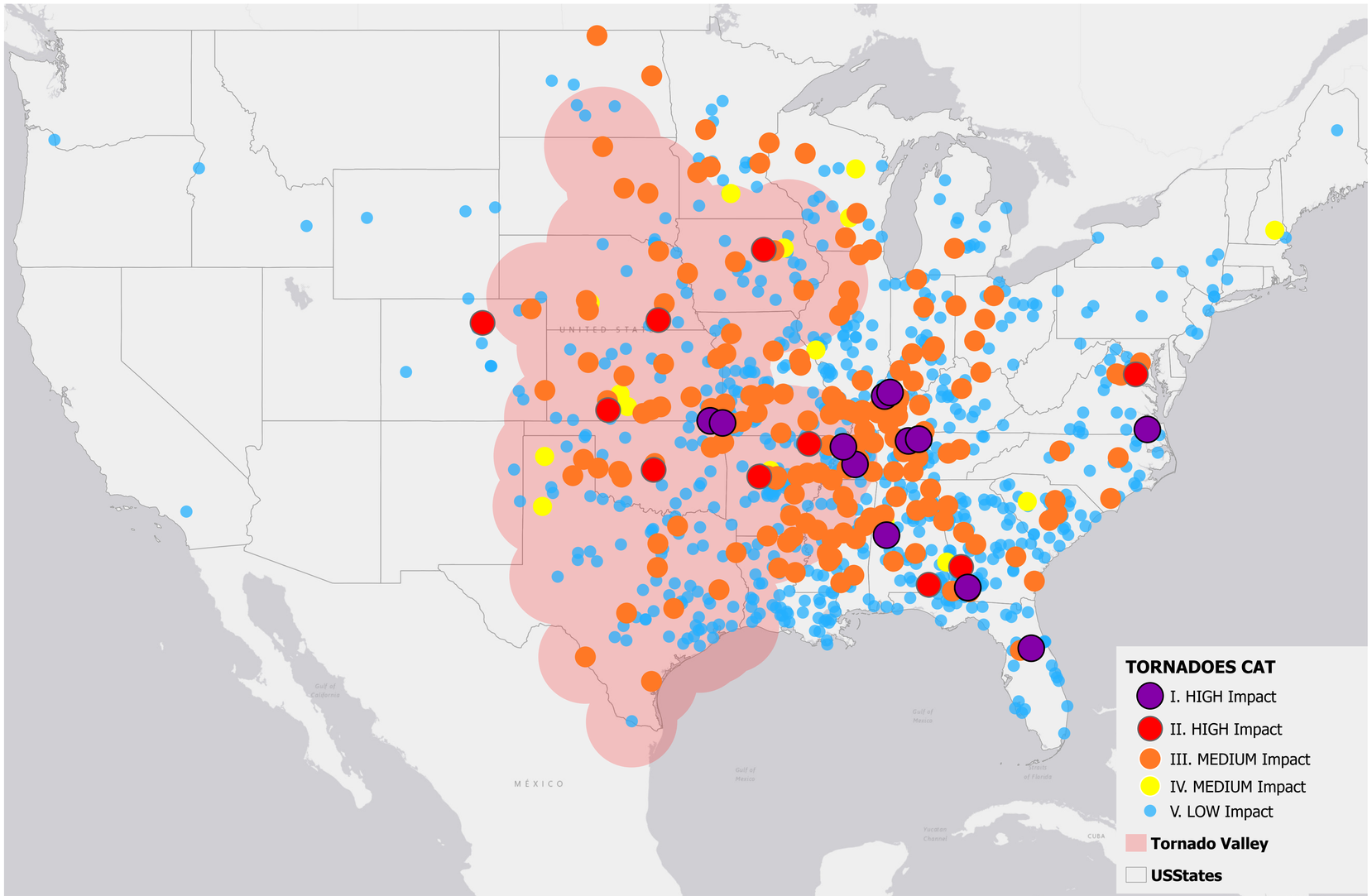
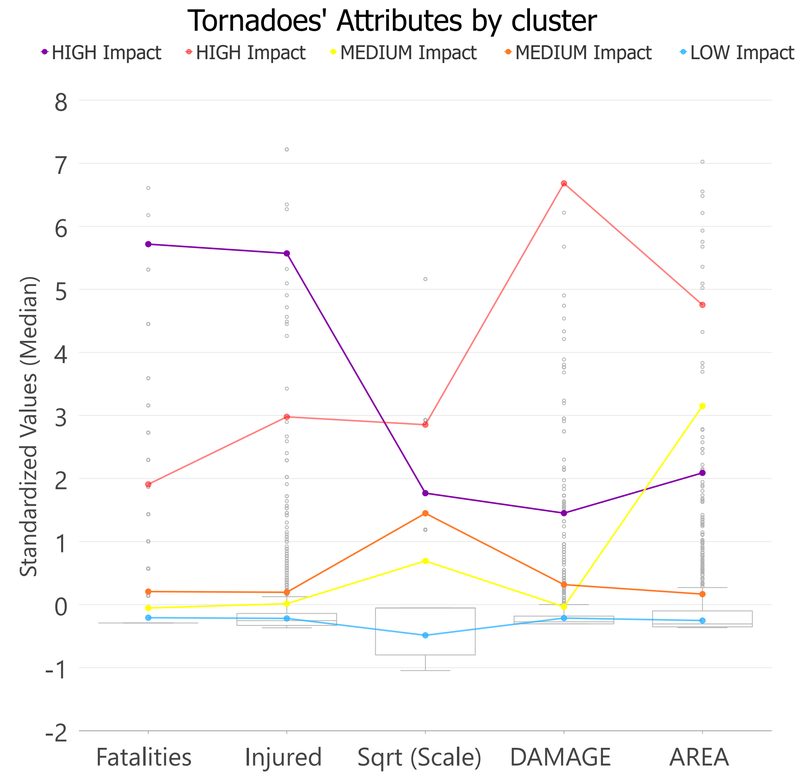
GIS. Assignment 9

March 26, 2022

TORNADOES IN THE U.S. (2000 - 2008)



Map 1. Tornadoes in the U.S. from 2000 to 2008 clustered by category. Data source: U.S. National Centers for Environmental Information



Graph 1. Tornadoes' Attributes by cluster for each tornado category

Category	Frequency	Area	Damage	Sqrt (Scale)	Fatalities	Injuries
I	15	92600	43.15	11.33	13.93	156.53
II	10	193194	171.72	15.7	5.1	88.2
III	182	20046.45	15.28	10.04	1.153846	14.82
IV	20	132648.5	6.65	7	0.55	10.05
V	685	4230.32	2.24	2.25	0.194161	3.91

Table 1. Mean attribute per tornado category

Key insights

The analysis consists of applying KMeans clustering into all tornadoes occurred in the U.S. from 2000 to 2008. The attributes used to measure the impact of tornadoes are: area covered, property damage, overall damage scale, number of fatalities, and number of injured. Tornadoes were assigned into one of five different clusters (categories) depending on those attributes.

As can be seen in Map 1, the resulting categories are: Cat I. High impact. Cat II. High impact. Cat III. Medium Impact. Cat IV. Medium impact. Cat V. Low impact. Map 1 also shows in a red hue the Tornado Valley (an area covering the states of Texas, Arkansas, Oklahoma, Kansas, Nebraska, South Dakota, and Iowa where tornadoes are more frequent).

It is worth noting that a large proportion of large and medium impact tornadoes take place within the boundaries of the Tornado Valley, and that low impact tornadoes (Cat V) are distributed more evenly all across the eastern part of the U.S.
It is also interesting that there is almost no tornado activity in the western part of the U.S. territory.

In the upper right side of the sheet, Graph 1 -which contains boxplots of the standardized values for the 5 tornado attributes by cluster- indicates that tornadoes in category I and II have the highest median in all 5 indicators except area.

Additionally, Table 1 shows that the frequency of high impact tornadoes is lower (15 and 10 for cat I and II, respectively) than for medium and low impact (cat III and IV register 182 and 20 occurrences) and with the vast majority of tornadoes (685, or 75.1% of total) being low impact tornadoes (cat V).
The average area covered by a Cat I tornado is 92,600 miles squared, while Cat IV tornadoes average the highest (132,648 miles squared).

In terms of property damage, Cat II tornadoes register the highest average cost (171.7 million USD), more than the 43.1 million USD associated to Cat I, perhaps because Cat II on average cover more area (193,194 squared miles) than Cat I tornadoes.

Columns 6 and 7 show that Category I tornadoes are the most dangerous in terms of human lives, with an average of 13.9 fatalities and 156.5 injuries; while cat V tornadoes, although 45 times more frequent, only result, on average, on 0.2 fatalities and 3.9 injured.