



Intensity-based sentiment analysis

The 2020 Aegean Earthquake

LEARNING FROM EARTHQUAKES: BUILDING RESILIENT COMMUNITIES THROUGH
EARTHQUAKE RECONNAISSANCE, RESPONSE AND RECOVERY

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OUTLINE

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Aerial view of Izmir after the 2020 Aegean earthquake
Source: Collapsed building after European-Mediterranean Seismological Centre



Background



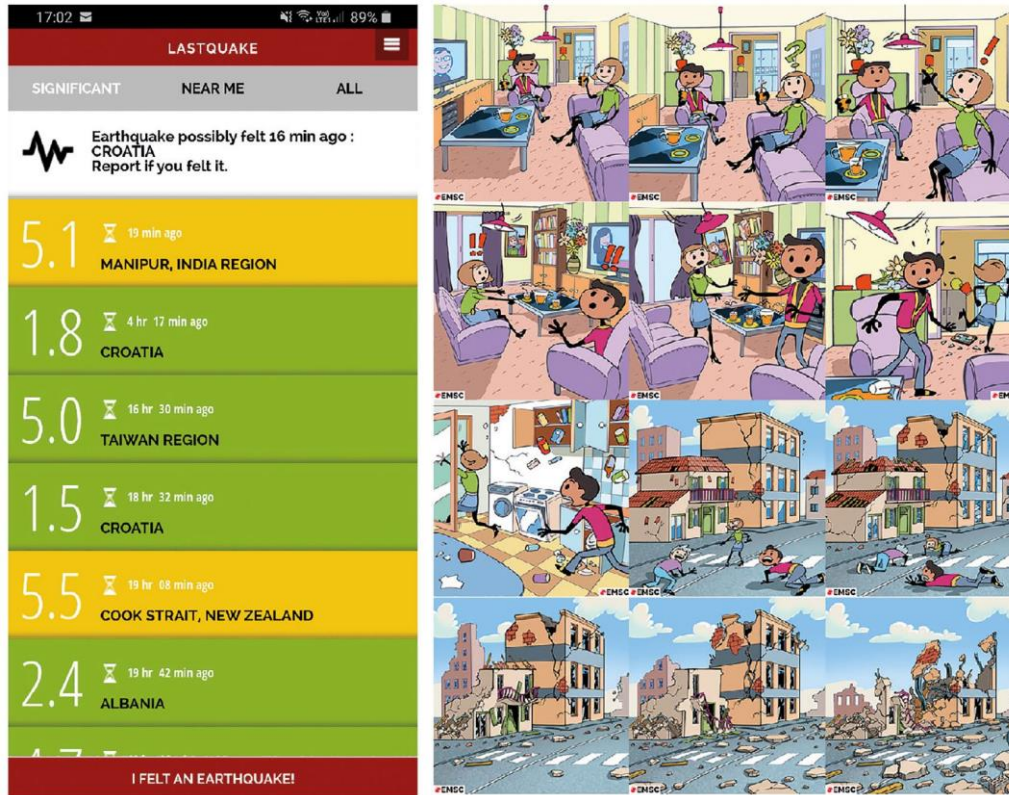
Tsunami effects



Collapsed building after the Aegean earthquake.



Background



LastQuake app – EMSC

3,028 Users reports
2,546 Users reports
2,518 Users reports

The LastQuake app screen (left) contains the latest felt earthquakes. Felt reports are collected by choosing one of the 12 cartoons (right) presenting different shaking and damage levels.

Source: Bossu et al(2018). LastQuake: From rapid information to global seismic risk reduction. IJDRR, 28, 32-42. doi:<https://doi.org/10.1016/j.ijdr.2018.02.024>. Figure 1. Page 4.

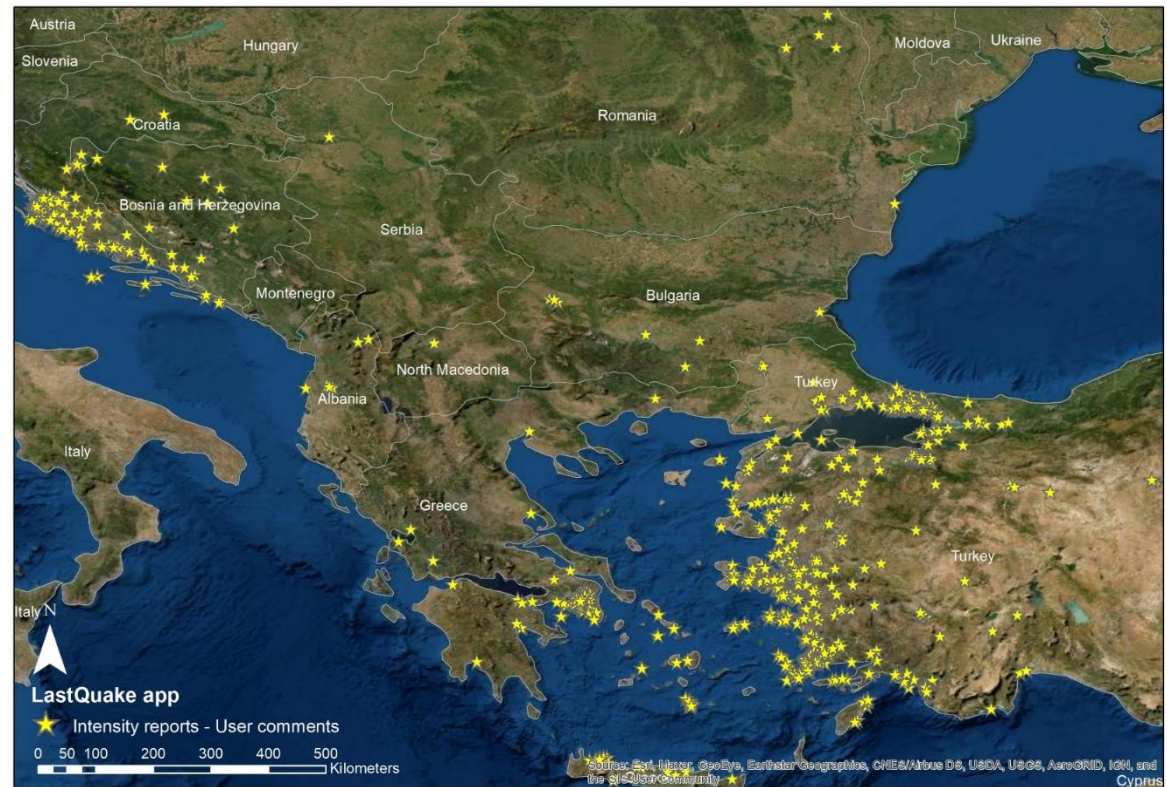
2,371 app – 123 mobile phone - 24 Desktop



Background



Languages	Number	Percentage
Turkish	1264	50%
English	898	36%
Croatian	255	10%
German	20	1%
Bosnian	11	0%
Slovenian	10	0%
Punctuation marks	10	0%
Albanian	9	0%
Numbers	9	0%
Romanian	7	0%
French	5	0%
Greek	4	0%
Italian	4	0%
Undefined	3	0%
Bulgarian	2	0%
Arabic	1	0%
Azerbaijani	1	0%
Czech	1	0%
Hungarian	1	0%
Latvian	1	0%
Polish	1	0%
Slovak	1	0%
Total	2518	100%



LastQuake users reports location. Data source: EMSC



Background



CSEM
EMSC
Modified Mercalli (MM)
Intensity scale

1		10	Extreme
4		9	Violent
12		8	Severe
36		7	Very strong
116		6	Strong
188		5	Moderate
417		4	Light
981		3	Weak
618		2	Weak
146		1	Not felt



LastQuake app

Image

Text



The house really moved. Feel this one was the strongest since the big one. I felt very light. It was pretty violent, but it was short. It woke me up from my sleep. I was afraid it would continue. I tried to create the triangle of life next to the sofa. Nothing moved but I heard walls cracking. I think it was because of the earthquake. Everything rattled for a few seconds. The cracks in our walls are getting bigger... Yep felt that one too. Short but strong 10:34 am Kuşadası - kadınlar Sea Mah. Happened 2 times. It woke me up. It took about 7 seconds..



Emergency Response & Early recovery Assessment

Sentiment Analysis (SA)



Polarity

Positive



Neutral



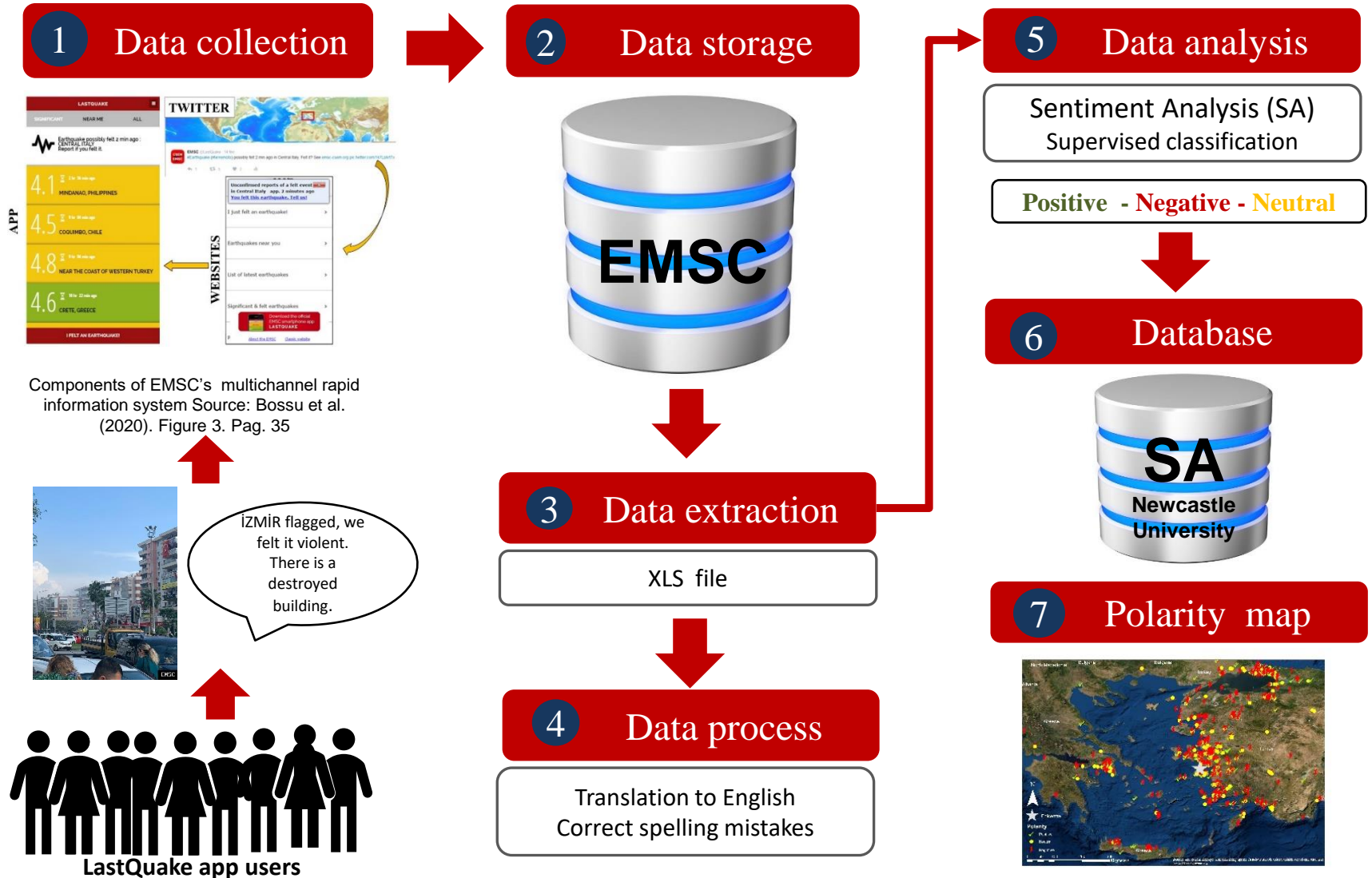
Negative



Not related



Methods: Sentiment Analysis (SA)



Methods: Sentiment Analysis (SA)

Rules

Polarity	Rules
Positive	<ul style="list-style-type: none">▪ Reports of light intensity▪ Reports of short seismic movements▪ Reports of slight shakes▪ Supporting and solidarity messages▪ Emergency response messages▪ Preparedness measures
Negative	<ul style="list-style-type: none">▪ Reports of long seismic movements▪ Reports of strong shakes▪ Reports of strong intensity▪ Reports of aftershocks▪ Report of damages in buildings and/or lifelines▪ Reports of injuries and/or casualties▪ Reports of fear and anxiety
Neutral	<ul style="list-style-type: none">▪ Seismic information

Rule-set for polarity classification of text data produced by LastQuake app users.



Positive

- 'Low damage'
- 'We felt it, but it was short'
- 'Everybody should respect and act according to scientific rules and regulations.
Otherwise, everybody will lose'

Negative

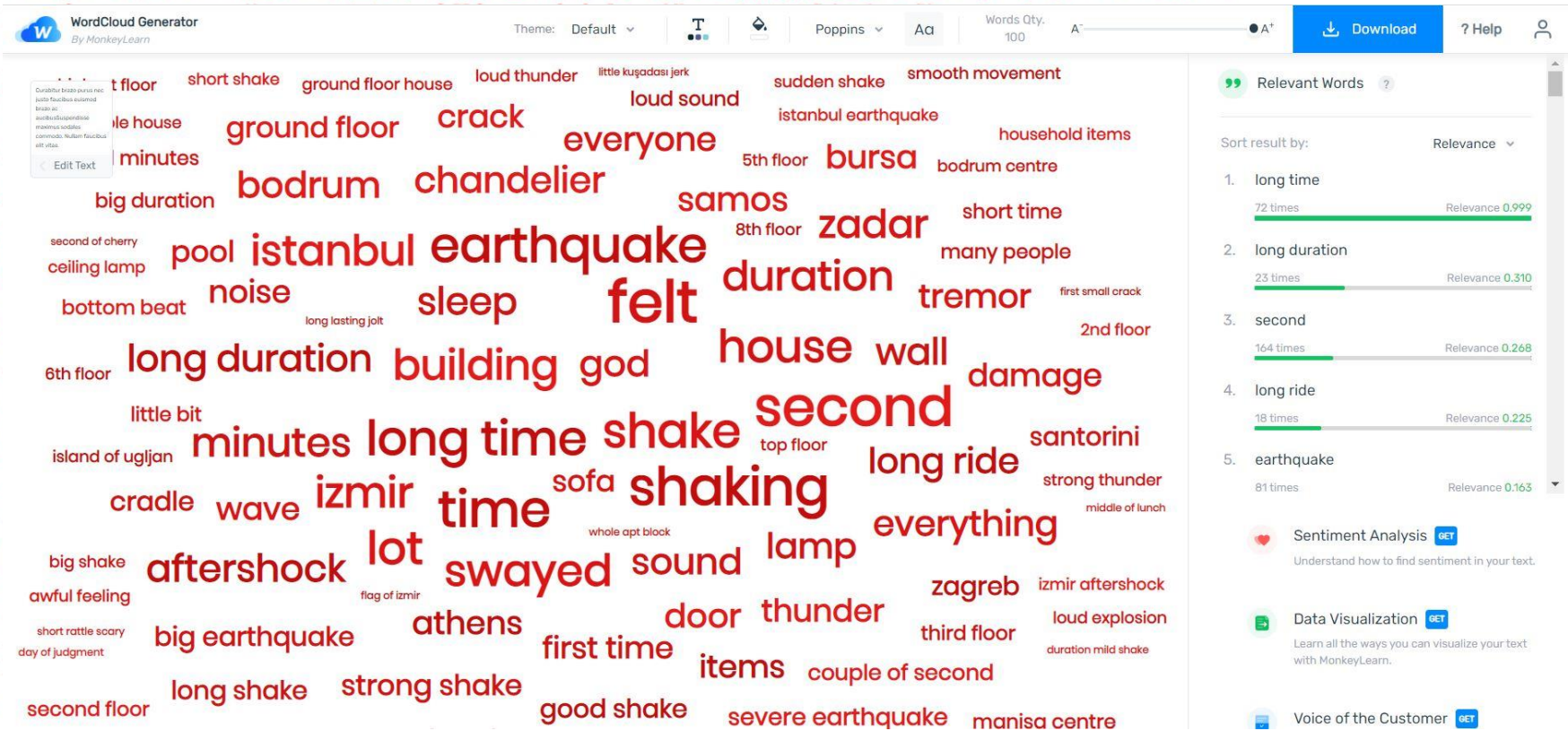
- 'Everything rattled for a few seconds. The cracks in our walls are getting bigger'
- 'Chios, Vrontados. Very strong shake, ground floor, cracks in walls objects fell.'
- 'I felt that earthquake when I was in school in Athens. The floor was moving and the walls too. It was very scary because it happened so suddenly!'

Neutral

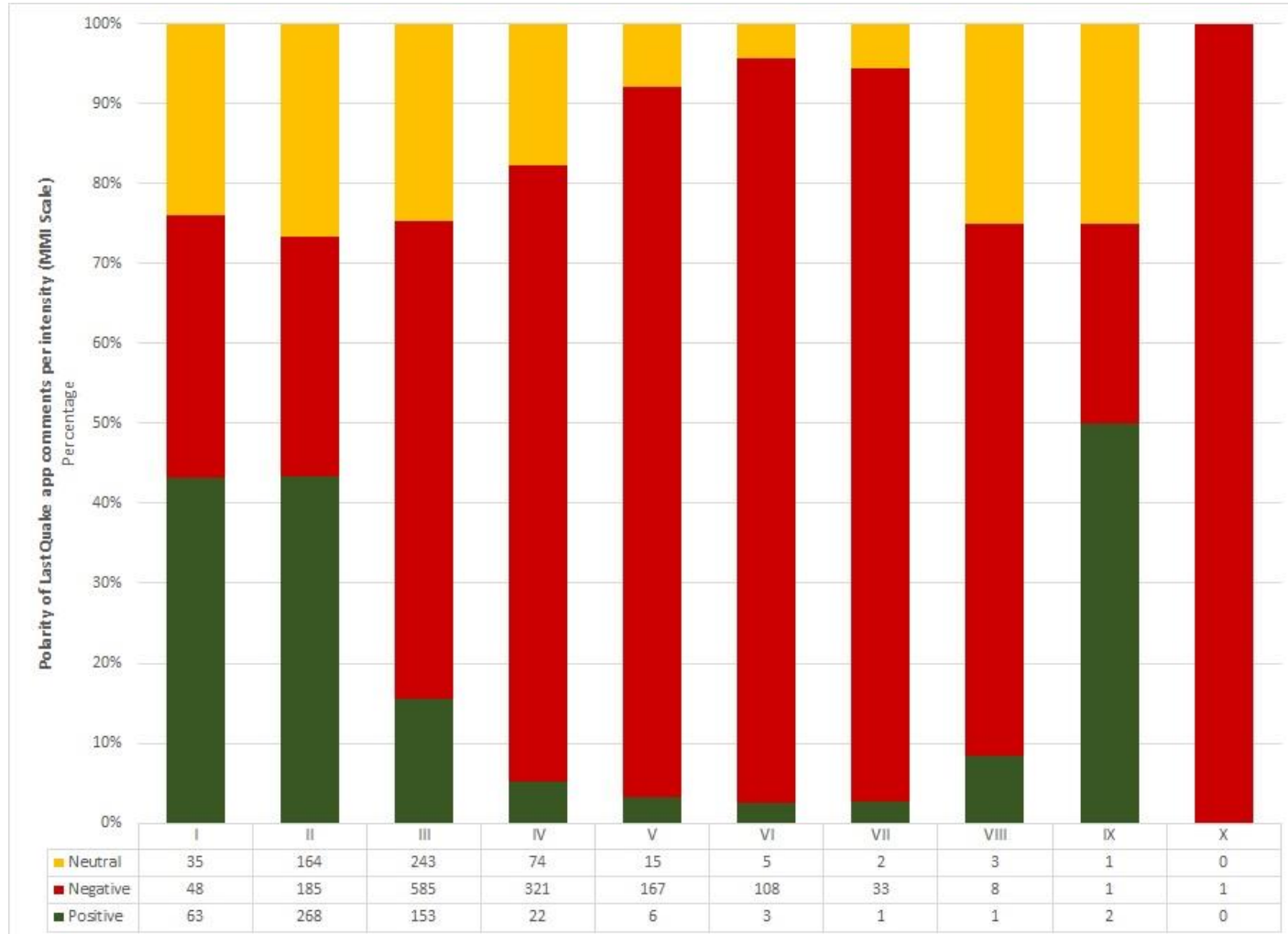
- 'The epicentre is in Samos, Greece, not in Western Turkey'.
- 'Moment intensity VI'
- 'It is not Dodecanese islands. It is North Aegean Samos island'



Results



Results



Polarity of LastQuake app user comments per levels of intensity in the MMI Scale.



Results

		MMI (Levels of intensity)	Positive Polarity (number of comments)	Negative Polarity (number of comments)	Neutral Polarity (number of comments)
MMI	Pearson Correlation	1	-.664*	-0.545	-0.629
	Sig. (2-tailed)		0.036	0.103	0.051
	N	10	10	10	10
Positive	Pearson Correlation	-.664*	1	0.499	.837**
	Sig. (2-tailed)	0.036		0.142	0.003
	N	10	10	10	10
Negative	Pearson Correlation	-0.545	0.499	1	.870**
	Sig. (2-tailed)	0.103	0.142		0.001
	N	10	10	10	10
Neutral	Pearson Correlation	-0.629	.837**	.870**	1
	Sig. (2-tailed)	0.051	0.003	0.001	
	N	10	10	10	10

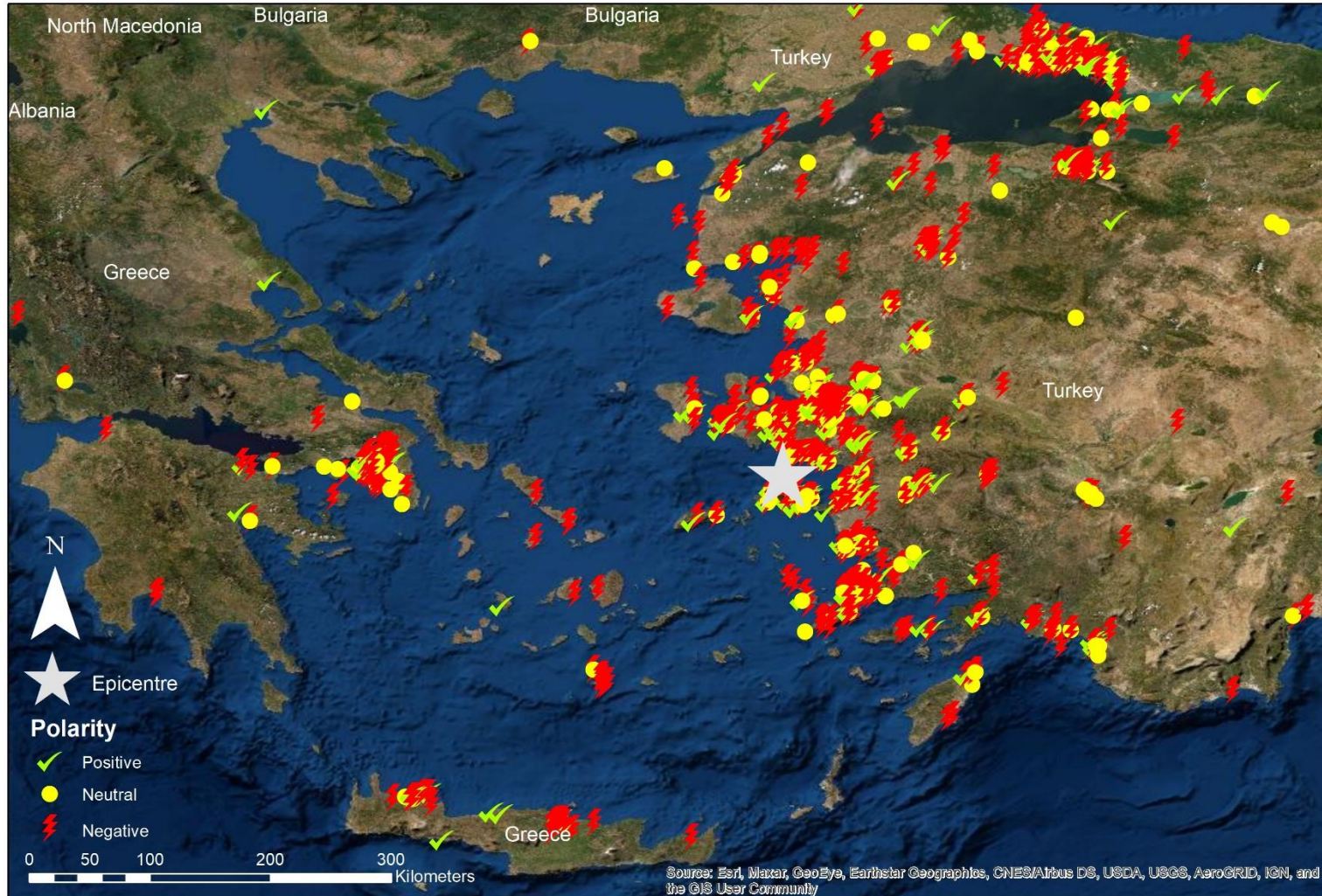
*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Two-tailed Pearson correlation analysis



Results



Location of LastQuake app users comments polarity.



Dataset

Available for public consultation at:

Contreras Mojica, Diana; Wilkinson, Sean; Fallou, Laure; Landès, Matthieu; Bossu, Rémy; Aktas, Yasemin Didem (2021): **Polarity and topic supervised classification of LastQuake app user's comments - Aegean 2020 earthquake.** Newcastle University. Dataset.

<https://doi.org/10.25405/data.ncl.14604354.v3>

DOI: <https://doi.org/10.25405/data.ncl.14604354.v3>

Conclusions

- **Comments with negative polarity include more data** that the comments in other polarities
- As the levels in the **MMI** scale **increase** the number of comments with **positive polarity decrease**.
- The **spatial distribution of negative polarity** is a proxy indicator of the **location of damages**.
- The description of **damages in buildings** is present in **comments with negative polarity** associated with the intensity reports from **III to VII** in the **MMI** scale
- The effects of the **tsunami** are described in **comments with negative polarity** associated with the intensity reports from **III to VII** in the **MMI** scale.



References

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THANK YOU

HVALA

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MULTUMESC

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Teşekkürler

