Montreal AI's AI-Debate 2: Twitter Data Analysis

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Objective: The aim of this work was to analyze discussions on Twitter related to Montreal AI's second AI-debate and to investigate the emotions towards AI (including deep learning, and symbolic AI) and the debate.

Methods: All tweets written in English, before and after the AI-debate (December 14, 2020 until January 2, 2021) were included. The tweets which had the terms "aidebate", "aidebate2" or "ai debate" were extracted using the Twitter API. The tweets by the organizers were removed to reduce the potential bias. The tweets related to another AI debate which occurred on December 14, 2020 were also removed. The analysis was done on the remaining of the tweets. All the raw data and processed tweets were saved in a password protected laptop.

Emotion analysis and geographic analysis of the included tweets were conducted. The word cloud of the tweets was also developed to get a visual estimation of the frequency of the words. We applied machine learning methods (including recurrent neural networks) to analyze the collected data. Emotion-classifier models of Colneric et al. [1] (Ekman's six basic emotions and Plutchik's eight basic emotions) were used.

Results: There were a total of 5,520 likes, 379 replies, and 4,469 mentions in tweets during the study timeframe. Out of 2,741 tweets analyzed, emotion analysis classified the following emotions consecutively as the highest ones during the study timeframe: (1) joy, (2) trust, and (3) fear (according to Plutchik's emotion model, Figure 1); and (1) joy, (2) fear, and (3) surprise (according to Ekman's emotion model, Figure 2). A similar work was conducted last year (link: https://github.com/rahimi-s-lab/Twitter-AI-Debate). The number of tweets this year were more (n= 2,741 comparing to n= 450), and we obtained more information pertaining to each tweet as we used the Twitter API (Figures 10-11). Further details on our analysis as well as details on the comparison of the debates (AI debate 1 and AI debate 2) provided below.
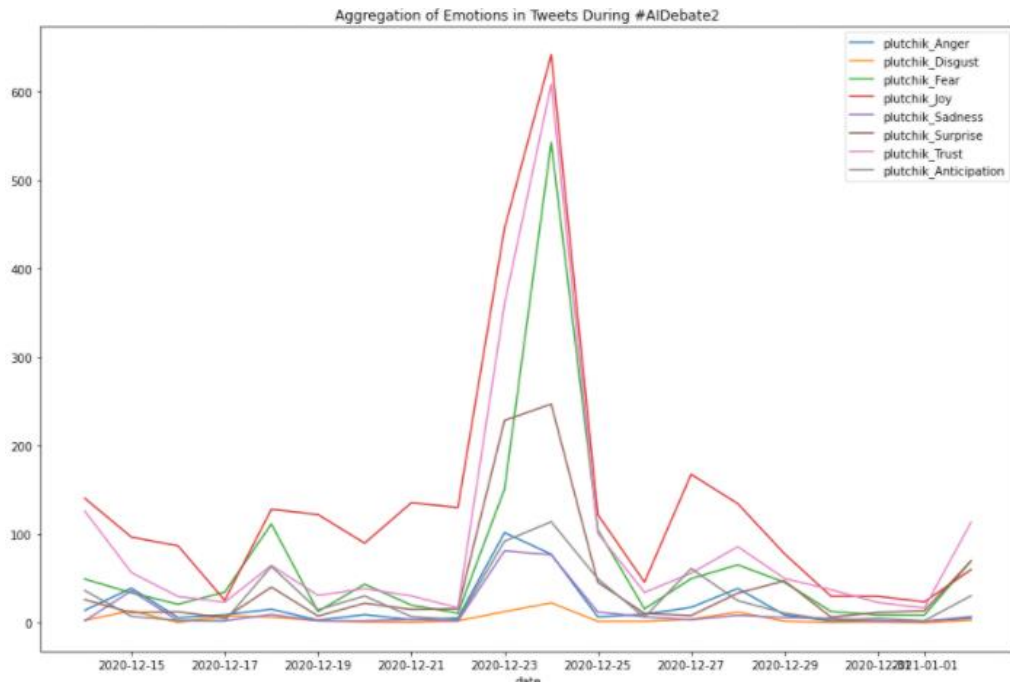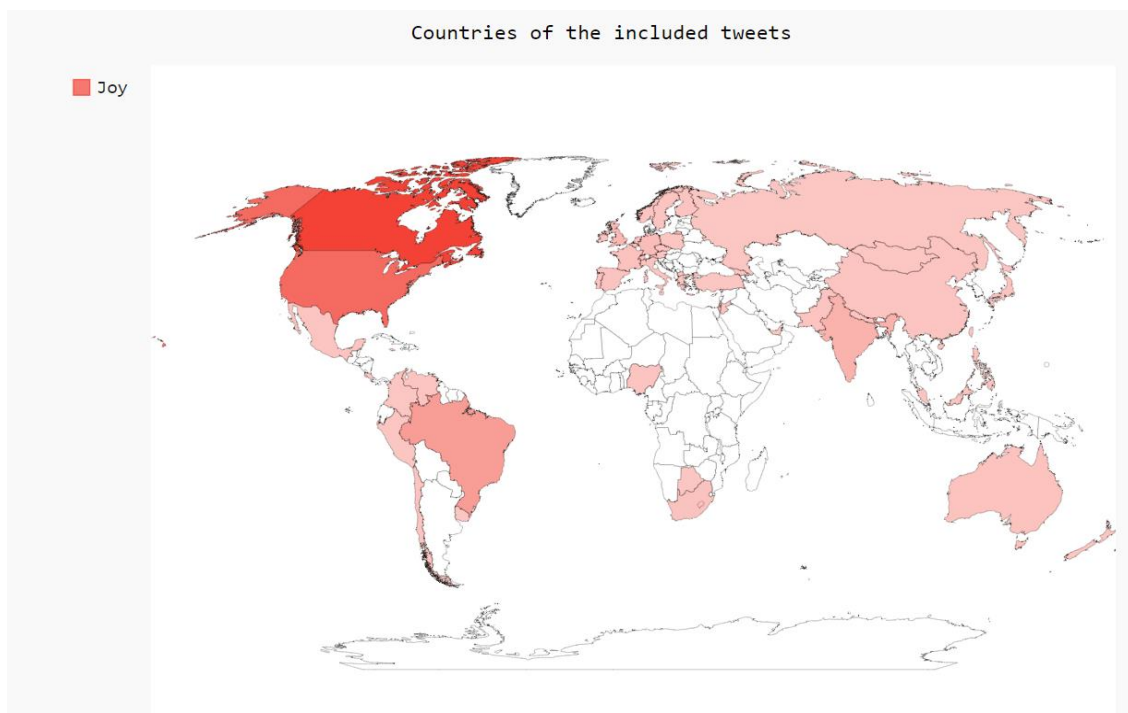
***Figure 1****: The emotion analysis (Paul Ekman defined emotions [2])*
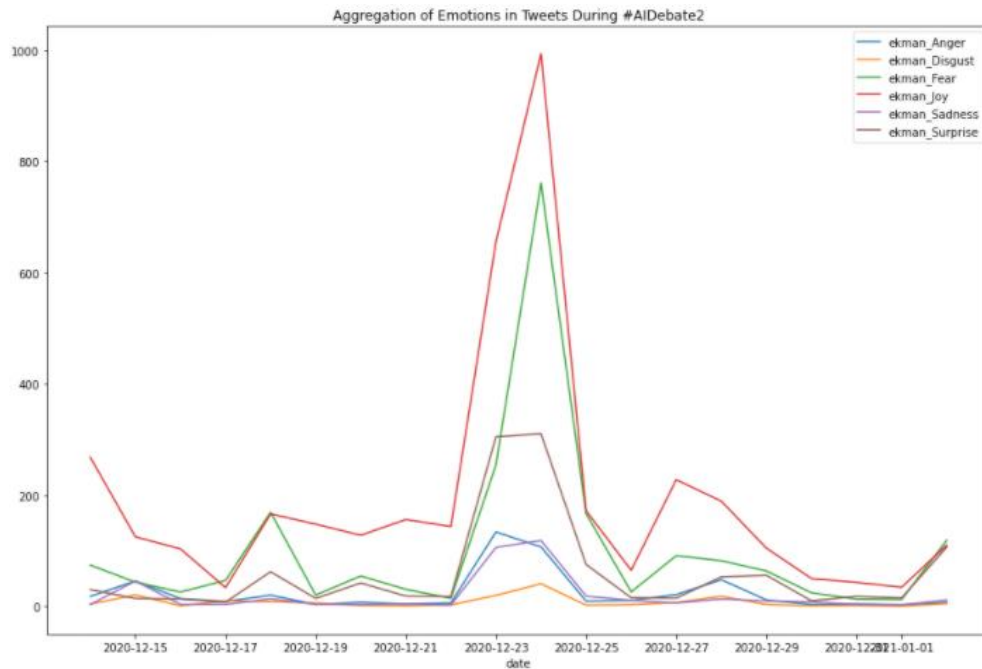
Figure 2: *The emotion analysis (Robert Plutchik defined emotions [3])*
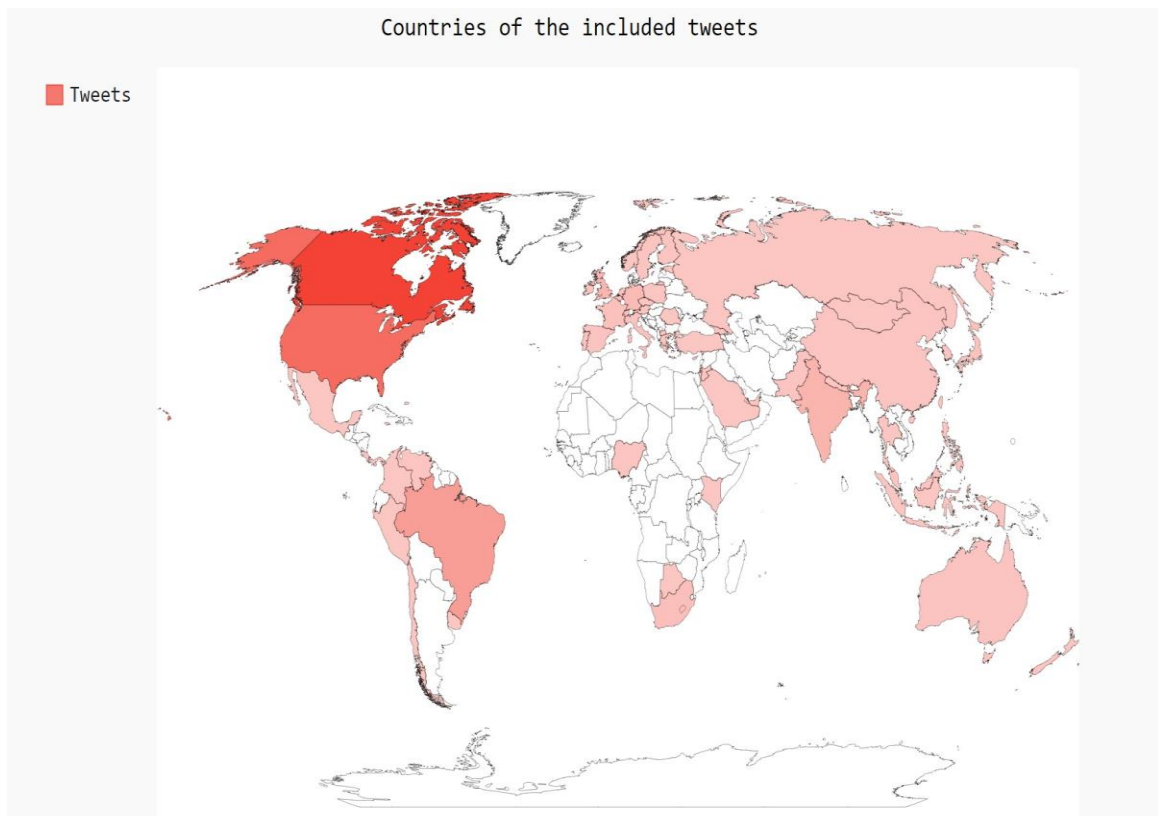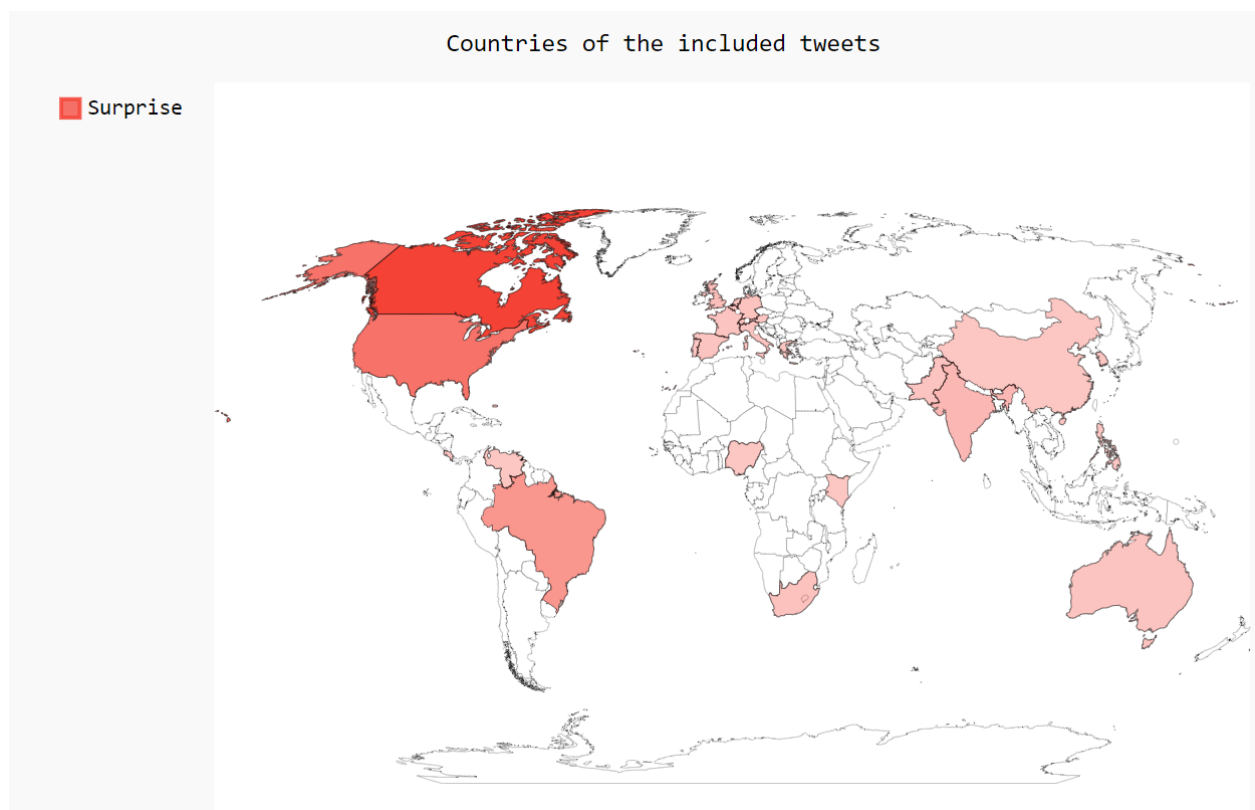
Figure 3. *Heat map of the tweets. The red regions represent the highest number of tweets while the white regions represent no tweets from that region.*
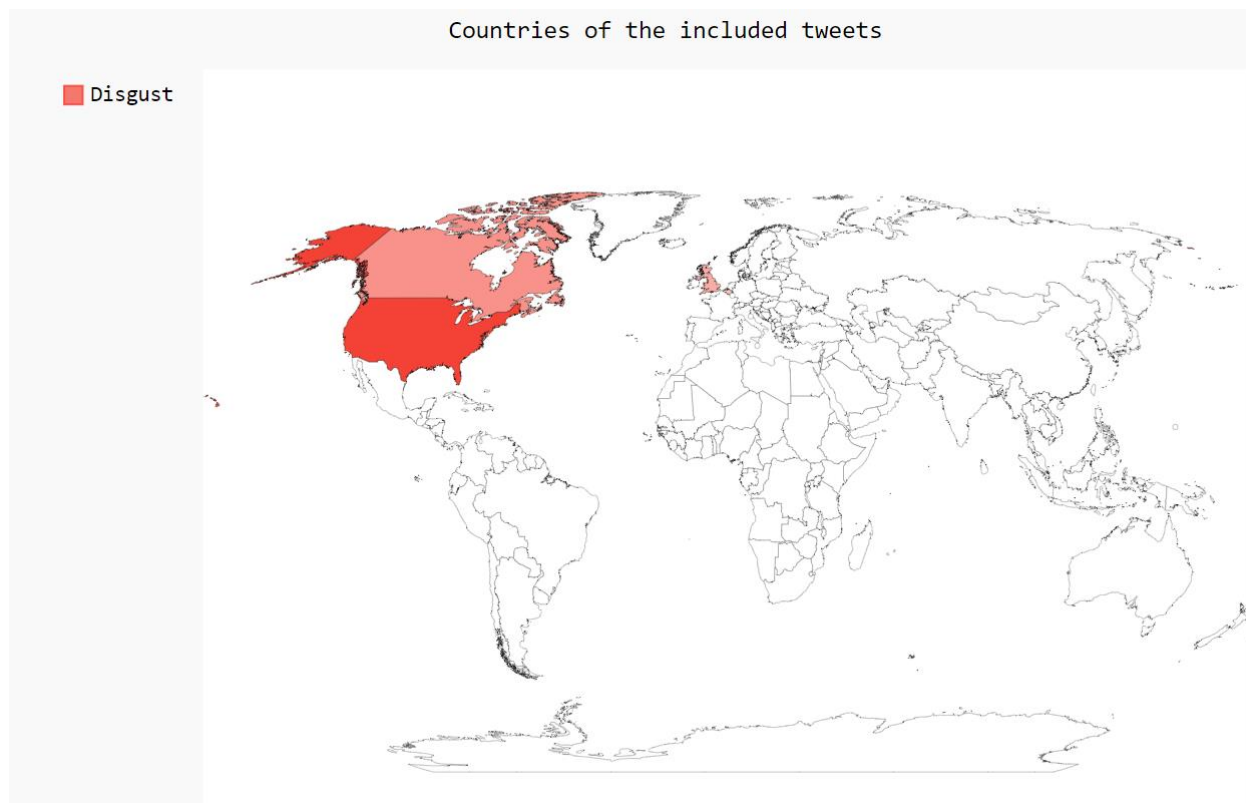

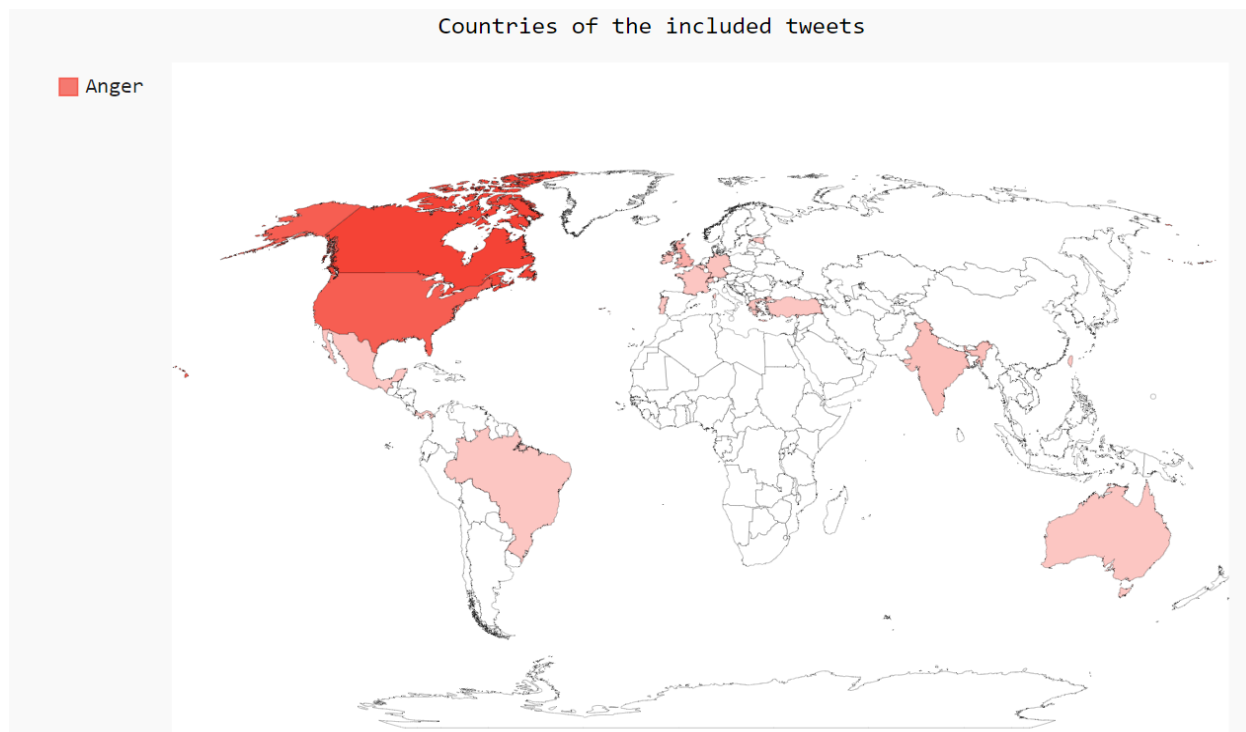***Figure 4.*** *Heat map of "Joy" emotion in different countries.*

Countries of the included tweets
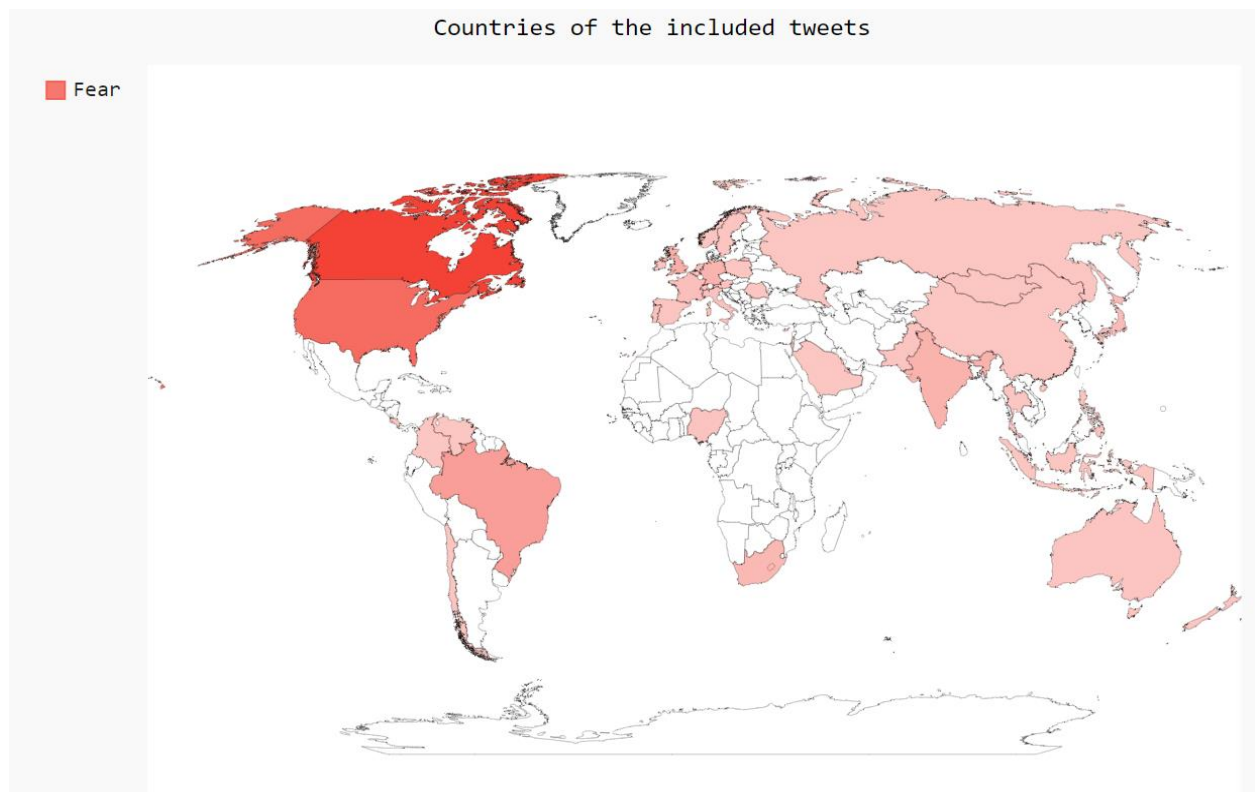
Fear

Figure 5. *Heat map of "Fear" emotion in different countries.*

Countries of the included tweets
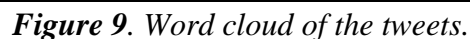
Surprise

Figure 6. *Heat map of "Surprise" emotion in different countries.*

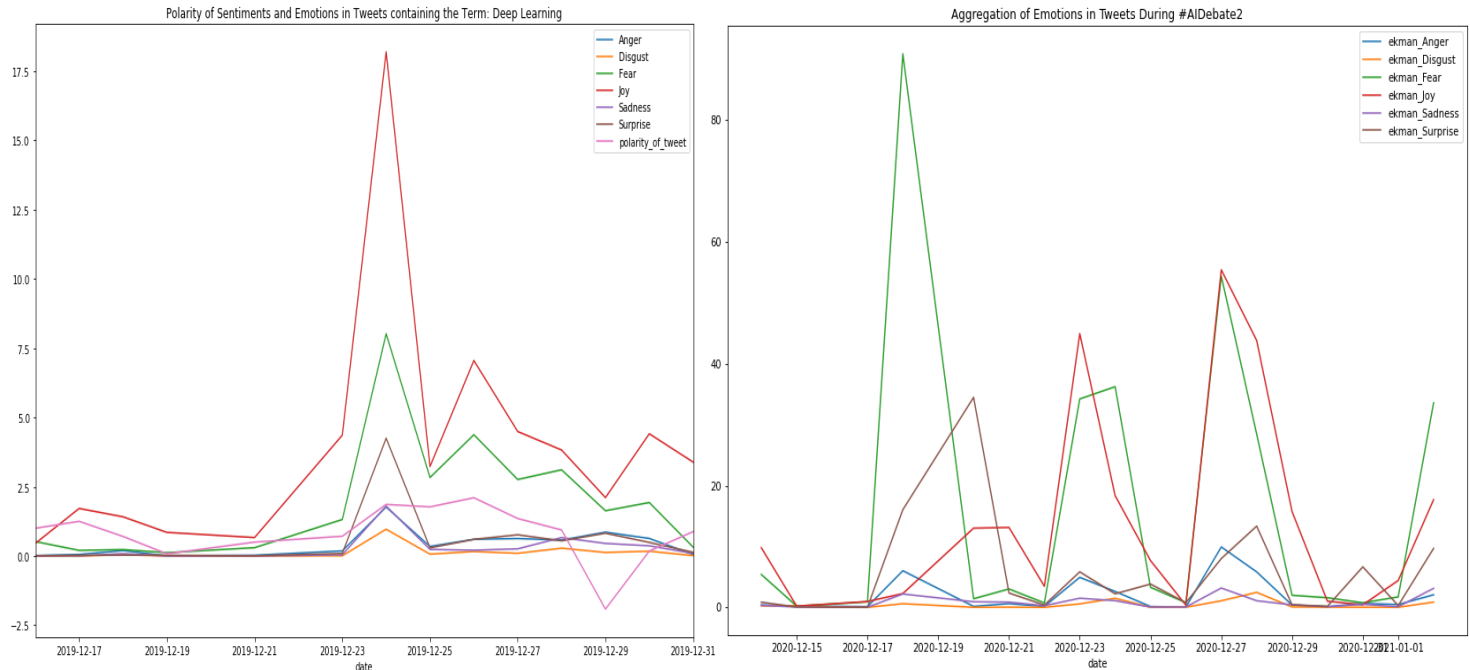***Figure 7.*** *Heat map of "Disgust" emotion in different countries.*

Figure 8. *Heat map of "Anger" emotion in different countries.*

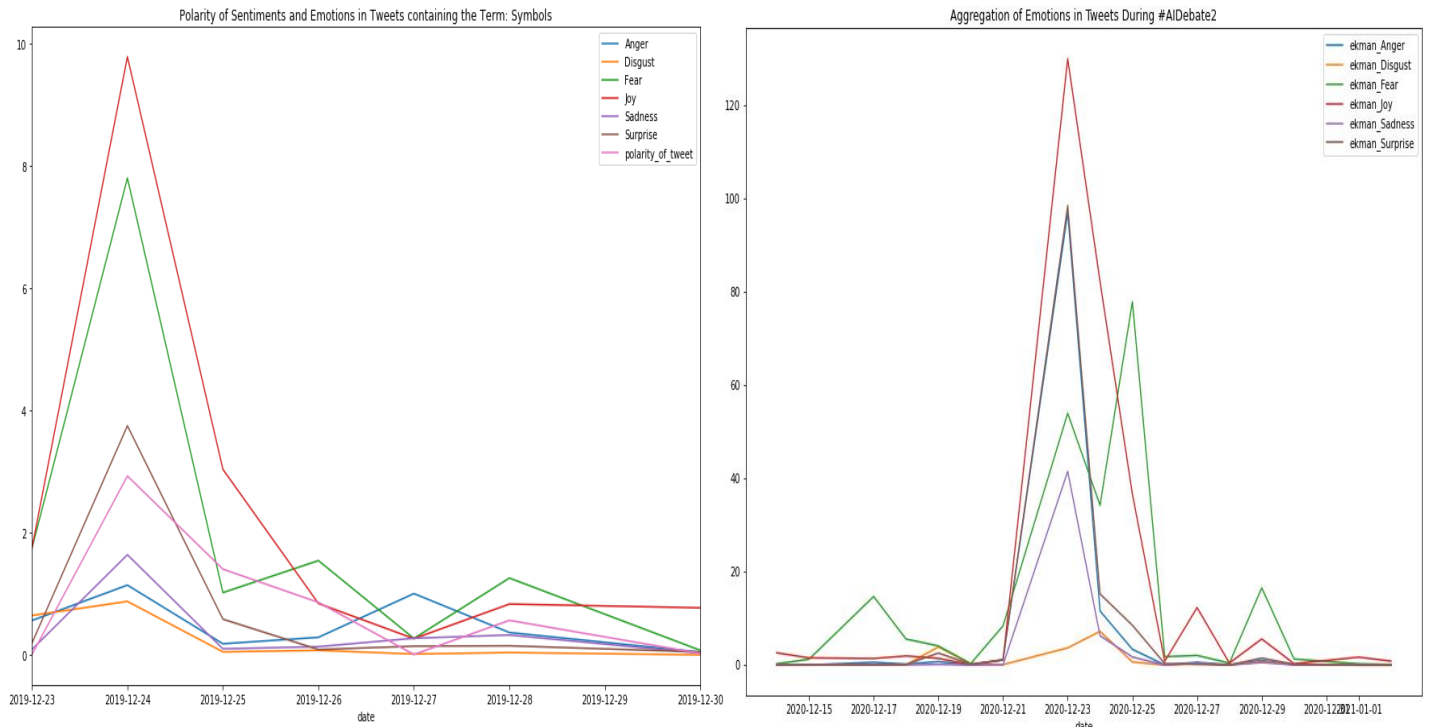***Figure 9****. Word cloud of the tweets.*

Comparison of the AI-debate 1 and AI-debate 2:

Figure 10. *Comparison of the emotions associated with term "deep learning" during AI-Debate-1 (left figure) and AI-Debate-2 (right figure).*
Note that the number of tweets during debate-2 (n= 2,741) were more than debate-1 (n= 450).

Figure 11. *Comparison of the emotions associated with term "Symbolic AI" during AI-Debate-1 (left figure) and AI-Debate-2 (right figure).*
Note that the number of tweets during debate-2 (n= 2,741) were more than debate-1 (n= 450).

- The emotion analysis based on Ekman's was used both last year and this year. However, this year we had more tweets and thus better estimation of the emotions. Last year, more tweets contained the term "Symbolic AI" before the debate and "deep learning" was discussed more after the debate. The results were opposite this year.
- The emotions of joy were among the top emotions for both debates.
- During this year's debate, the tweets related to "deep learning" were more distributed and there was a peak before the debate, and the fear emotion increased before the debate related to deep learning. Which during and after the debate, joy was the top emotion.
- Regarding the term "symbolic AI", the order of top 3 emotions in the tweets changed from joy, fear and surprise (in AI-Debate-1) to joy, anger and surprise, then fear (AI-Debate-2). In comparison to the last year, this year the emotion of fear toward symbolic AI decreased.

Code Availability

The codes are available at: https://github.com/rahimi-s-lab/AIDebate2-

Author contributions

Data collection and analysis was done by Arka Mitra under supervision of Dr. Rahimi.

Competing interests

There is no competing interest as far as we know.

References

[1]   N. Colneric and J. Demsar, "Emotion Recognition on Twitter: Comparative Study and Training a Unison Model," *IEEE Transactions on Affective Computing,* vol. 11, no. 3, pp. 433-446, 2020/07/01 2020, doi: 10.1109/taffc.2018.2807817.

[2]   P. Ekman, "An argument for basic emotions," *Cognition and Emotion,* vol. 6, no. 3-4, pp. 169-200, 1992/05/01 1992, doi: 10.1080/02699939208411068.

[3]   K. K. Imbir, "Psychoevolutionary Theory of Emotion (Plutchik)," in *Encyclopedia of Personality and Individual Differences*, V. Zeigler-Hill and T. K. Shackelford Eds. Cham: Springer International Publishing, 2017, pp. 1-9.