Categorizing E-Cigarette-related Tweets using BERT Topic

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SIGNIFICANCE

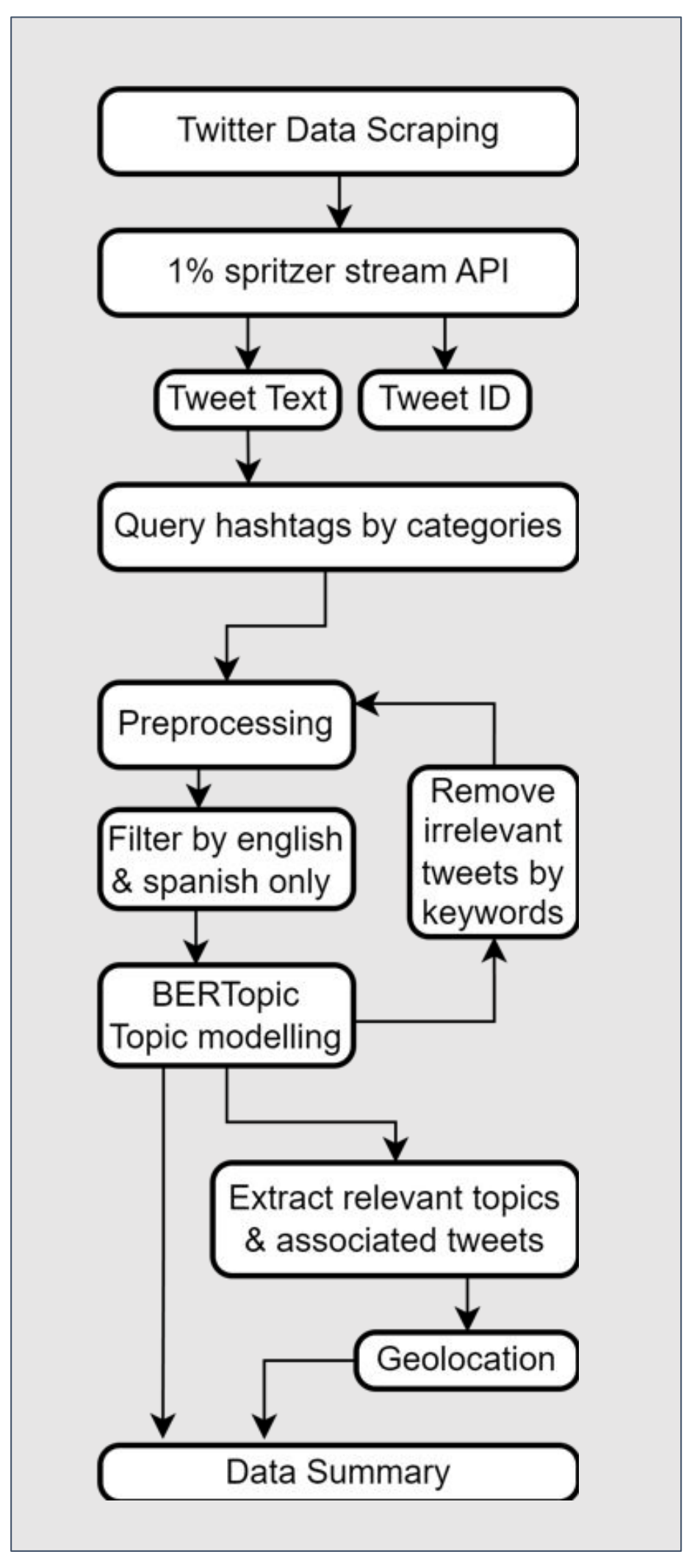
- Social media platforms have become a popular forum for discussing e-cigarettes
- Several studies have found a significant increase in e-cigarette and vaping discussions
- Topic modeling remains underutilized as a method for analyzing e-cigarette related messages on social media
- This study focused on ascertaining the extent to which themes and topics in e-cigarette-related tweets can be rendered using machine learning and topic modeling

DATA

154,281 (121,000 unique) tweets from 98,634 unique individuals collected from November 2022-February 2023 using a custom developed Python script deployed on a Oracle Cloud virtual machine.

METHOD

- Topic modeling (BERTopic) was used to derive vape-related tweet clusters.
- Experts in tobacco control removed irrelevant topics through an iterative process.
- Automated geoparsing methods were used to infer the location of tweets.
- Python langdetect library was used to filter out non-English and Spanish language tweets.



Twitter Data Scraping

1% spritzer stream API

Tweet Text

Tweet ID

Query hashtags by categories

Preprocessing

Filter by english & spanish only

Remove irrelevant tweets by keywords

BERTopic Topic modelling

Extract relevant topics & associated tweets

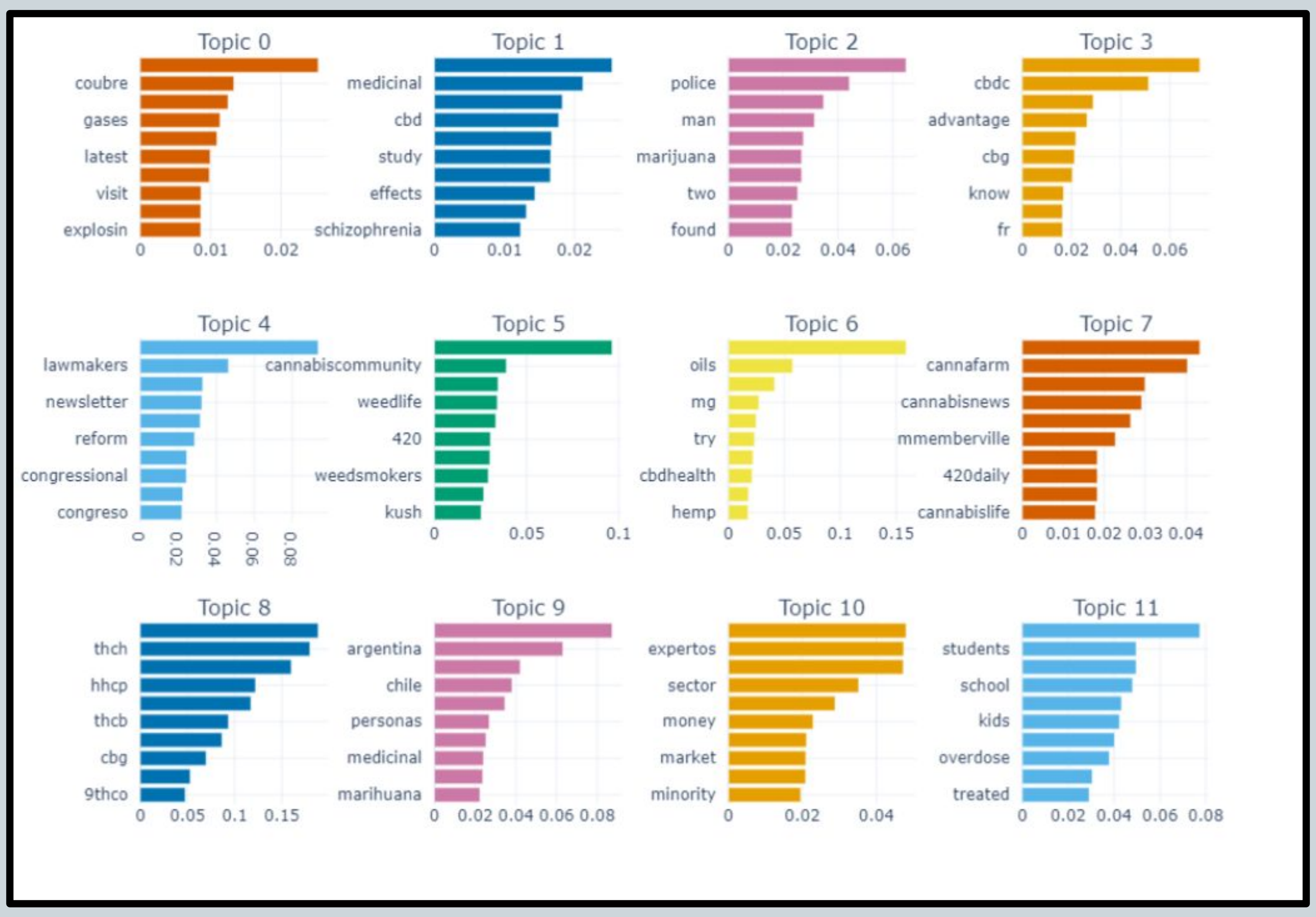
Geolocation

Data Summary

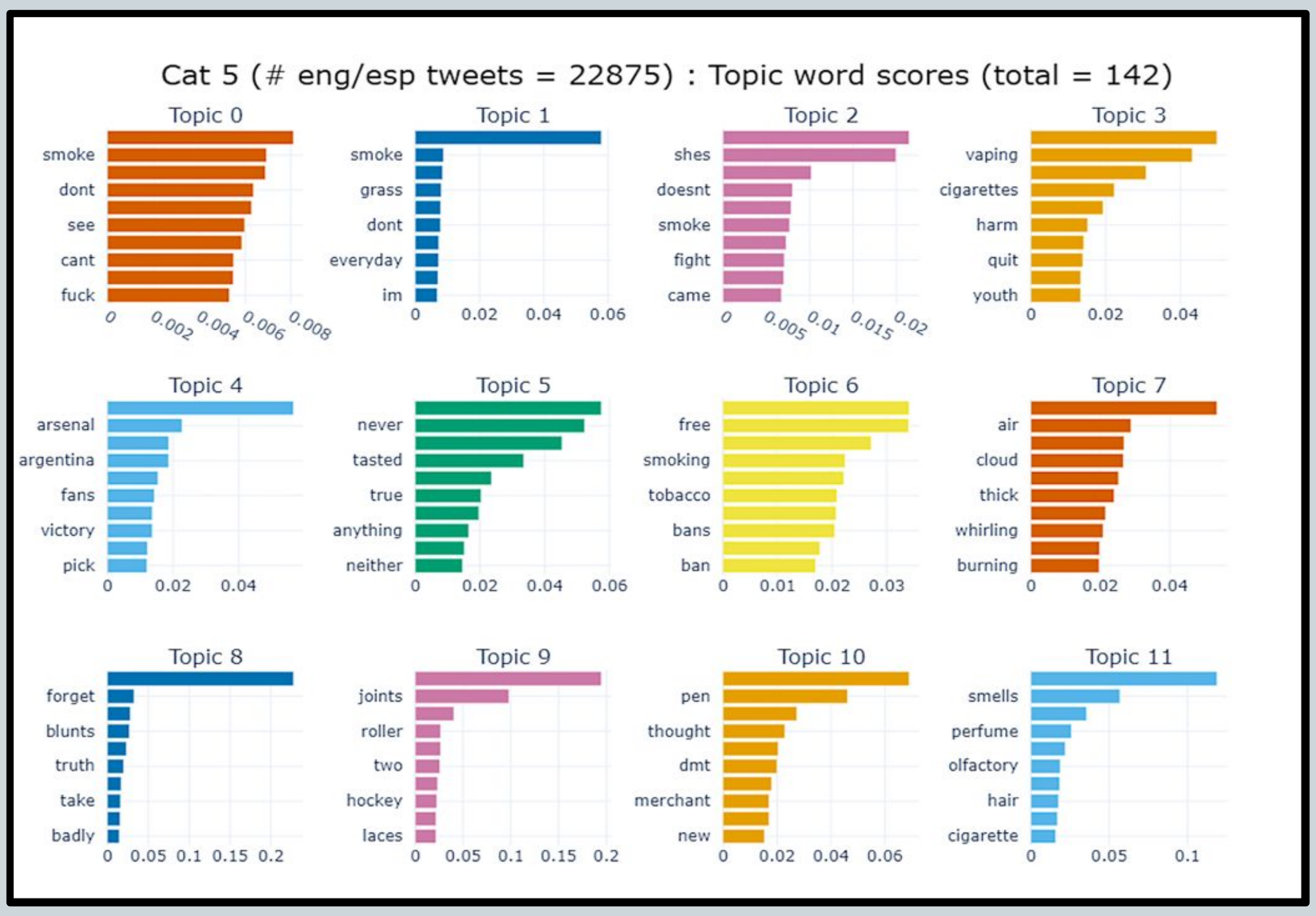
Computational topic modeling successfully identified 90 relevant topics (e.g., regarding brands, flavors, and regulation) across 6 thematic categories

RESULTS

- Clustered >100,000 e-cigarette-related tweets in English and Spanish into a total of 90 relevant topics (e.g., regarding brands, flavors, and regulation) across 6 broad thematic categories.
- Correlation and inter-topic map analysis indicated most topics were unique (correlation value < .5) and did not overlap.
- Inter-topic maps visually confirmed that topics within each category (n=6 categories) were mutually exclusive and unique.
- United States had the highest number of tweets related to vaping; however, most tweets (95%) could not be geolocated.



Topic modeling results of top 12 topics in category 2, with e-cigarette-related topics framed with red boxes; values represent c-TF–IDF scores per keyword



Topic modeling results of top 12 topics in category 5, with e-cigarette-related topics framed with red boxes; values represent c-TF–IDF scores per keyword

CONCLUSION

- This study highlights the need for continued monitoring of e-cigarette-related discussions on social media platforms.
- Social Media can have significant implications for public health messaging.
- Our study provides valuable insights into the topics and themes that are most discussed in e-cigarette-related tweets on Twitter and demonstrates the potential of BERTopic as a tool for analyzing large-scale social media data.

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