Using automatic clustering to identify themes from vape related content on TikTok

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Introduction

- TikTok is a frequent source of youth exposure to e-cigarette content
- Manual coding of TikTok content requires many human labor hours
- Machine learning techniques, such as image clustering, can facilitate the distillation of e-cigarette content on TikTok into common themes

Data Collection

- Scraped 16 vape-related words (e.g., “e-cigarette”, “e-liquids”) and 15 hashtags (e.g., #vape, #vapelife)
- N=812 (non-English videos and videos not available removed from 1510 collected videos)
- We took one screenshot per video that best reflected the video's e-cigarette content.

OPTICS Clustering Algorithm

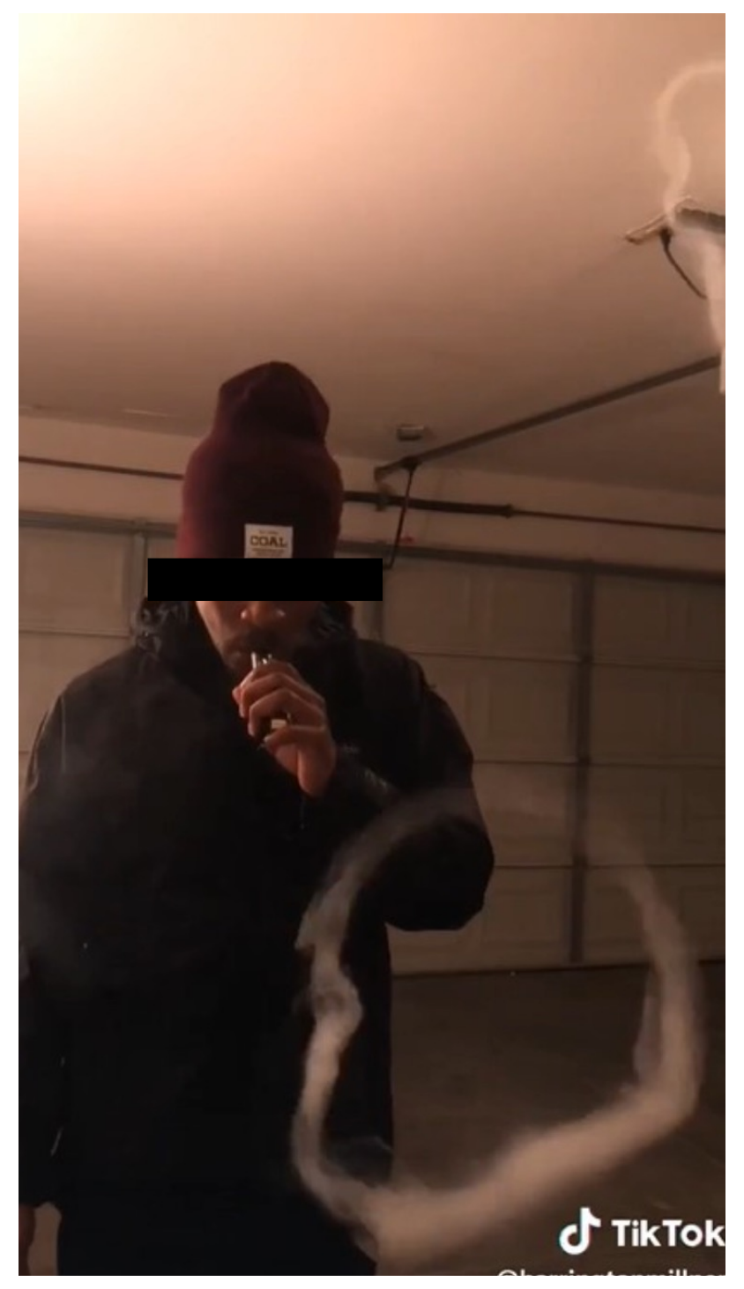
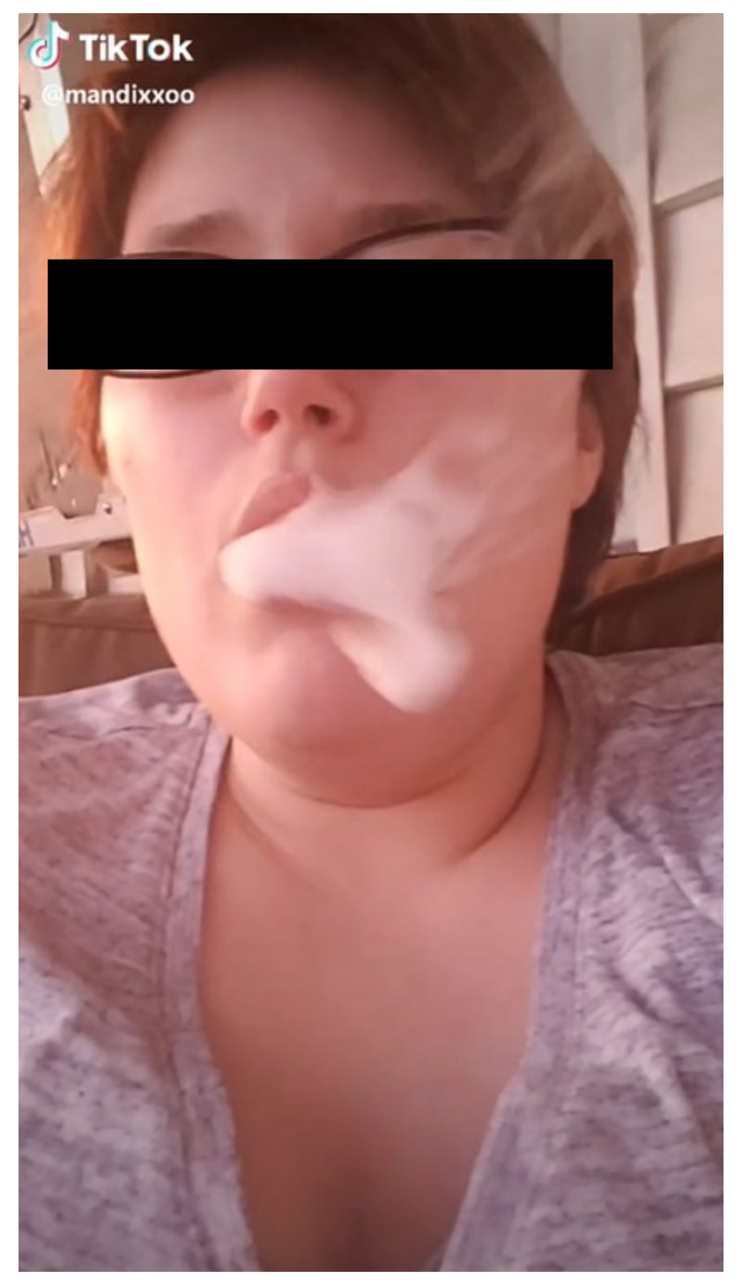
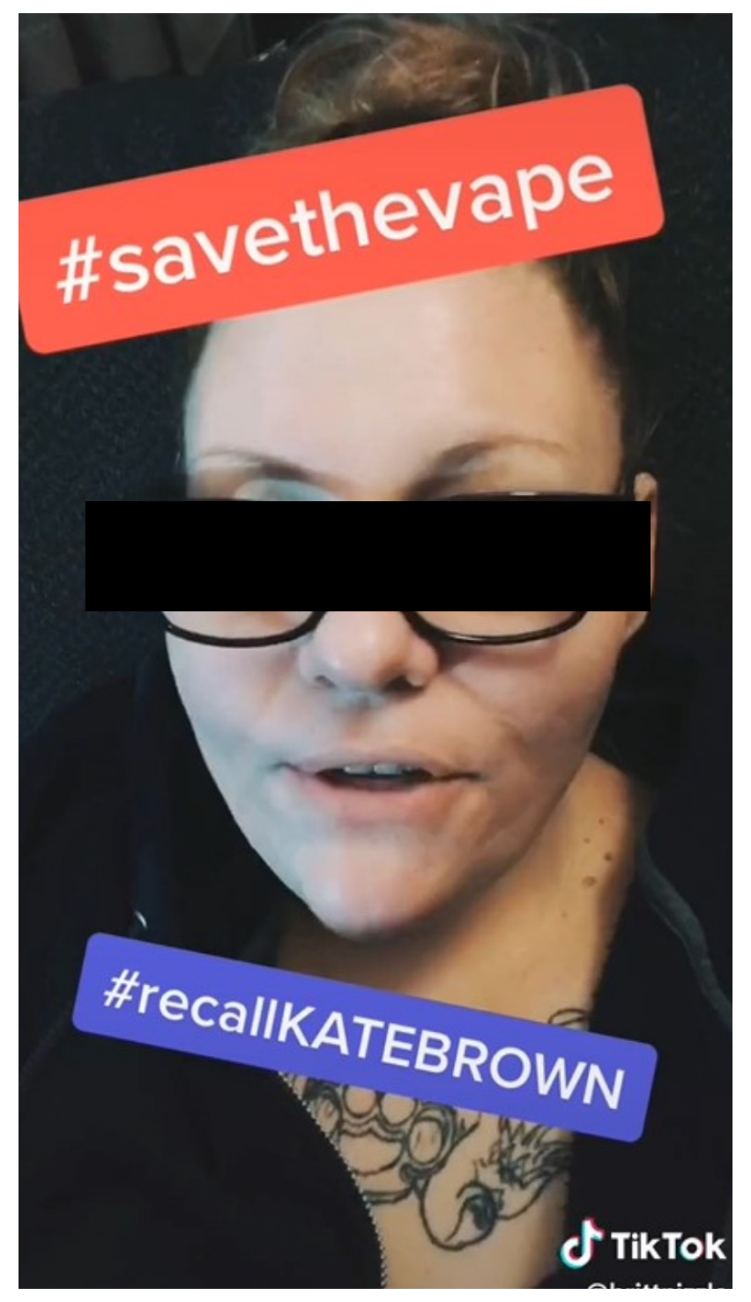
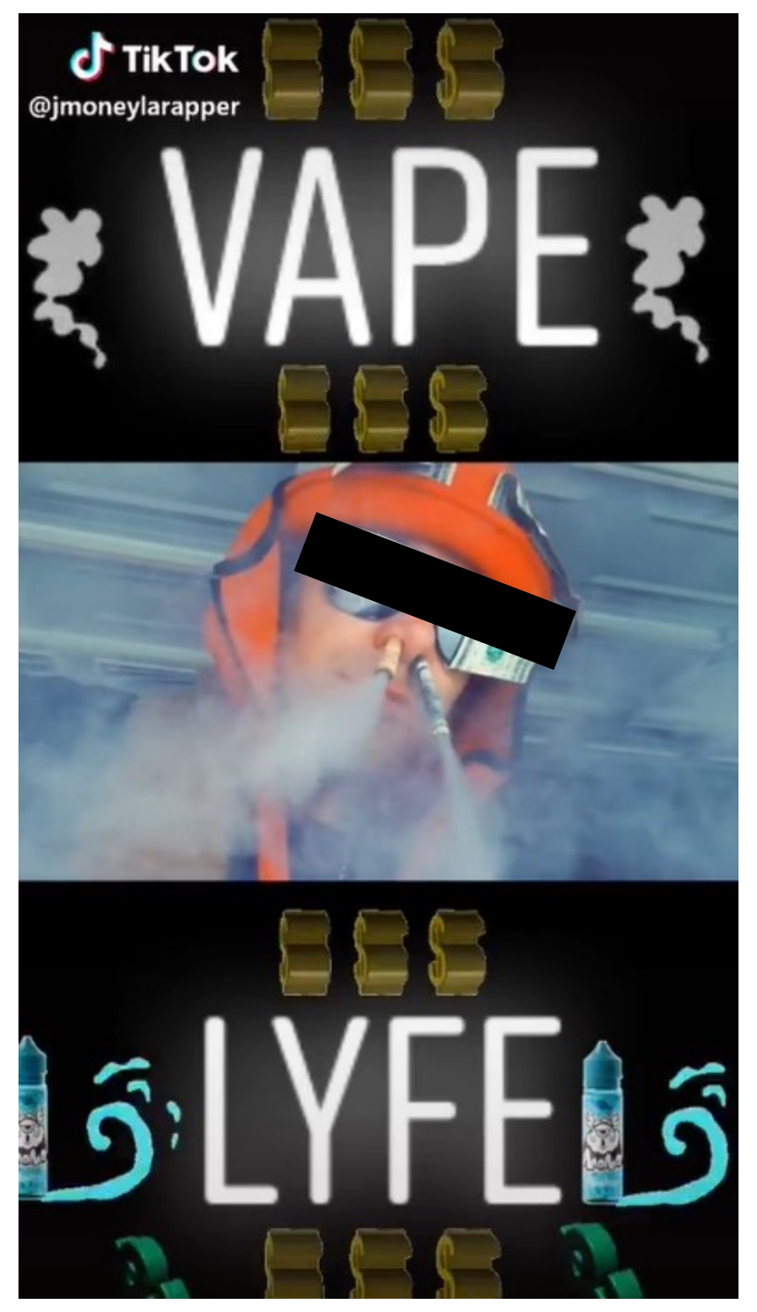
- We use “OPTICS”: Ordering Points To Identify Cluster Structure
- OPTICS is an unsupervised clustering algorithm
- It identifies groups of data points that are “similar” to each other based on certain features
- Features are obtained from images in our data
- No manual labelling of data is required while inputting into the model

Methods

- The OPTICS clustering model successfully grouped images into 20 clusters based on visual mathematical similarities.
- We decided the final number of clusters by examining using grid search for optimal parameters
- We manually scanned resulting clusters for coherence among images.

Results: Image Clusters and Model Results

- We found optimal parameters for OPTICS clustering to be epsilon=10e-10 and xi=0.01
- Combined with qualitative analysis, the research team analyzed the clusters and identified 7 overarching vaping related themes from the 20 clusters.

7 themes:						
1. Visible Vaping Devices	2. Visible Smoke Rings	3. Small Clouds of Vapor	4. Videos edited to have a vape related text overlay	5. Vapor covering faces	6. Videos with both text and vapor	7. Other (e.g.: people talking about vapes in the video but no visible vapes present)
						

Blackened to preserve privacy.

Conclusion

- Our model successfully clustered images into 7 interpretable themes.
- Clustering can be used to effectively interpret vape-related image data into common themes at scale.
- This method can be used to identify vape related content on social media and may be useful to identify trends across time.

Future Work

- This methodology can be extended to other photo/video based social media platforms (e.g., Twitter, Instagram) to identify vape and other tobacco related content
- Further work is needed to evaluate the capacity of machine learning to monitor e-cigarette content on social media to inform tobacco regulatory science

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