Happiness and Movement on Twitter

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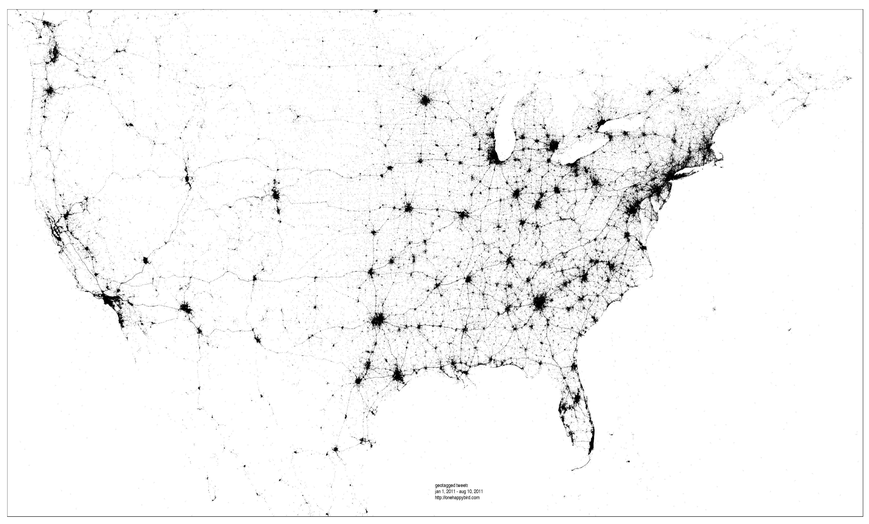
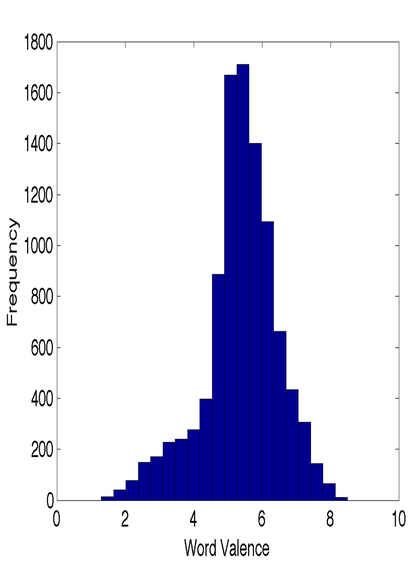
Measuring happiness: the Hedonometer & Twitter

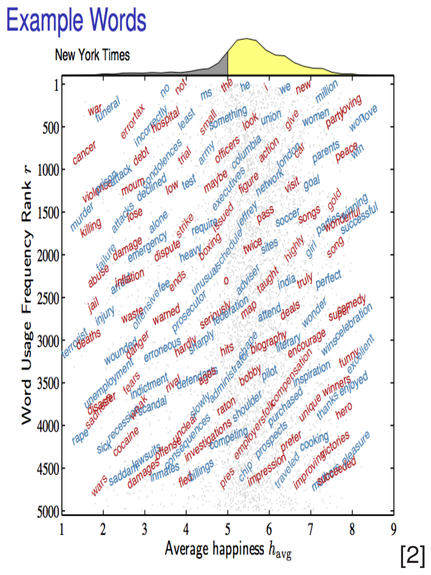
Using status updates collected from Twitter's gardenhose feed, we explore population-level **happiness**. We employ a simple real time hedonometer[1] that is effective on large quantities of text. Many Twitter users enable geo-location of their tweets. For these users, we explore the relationship between their location, average movement, and happiness.

(Bottom) Each point corresponds to a location somebody tweeted from in the U.S. during 1/1/11 to 8/15/11. Cities and the interstate highway system are clearly distinguishable on the plot.



Large Scale Word Assessment

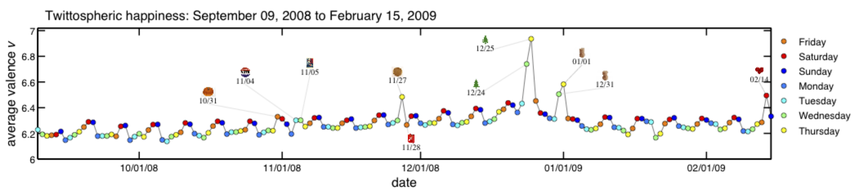




[2]

(Above Left) Using Google Books, music lyrics, New York Times articles, and tweets, we compiled a list of the 10000 most frequently used words in the English language. These words were submitted to Mechanical Turk for human evaluation of word happiness on a scale of one to nine. We use the average valence score for each word. We provide the resulting Word Valence Distribution.

(Above Right) Example words from the New York Times are plotted as a function of usage frequency and average happiness. **(Below)** We use these valence scores to infer the happiness of a population based on their word choices; for example, monitoring the happiness of Twitter users on a daily basis.



President E. Thomas Sullivan
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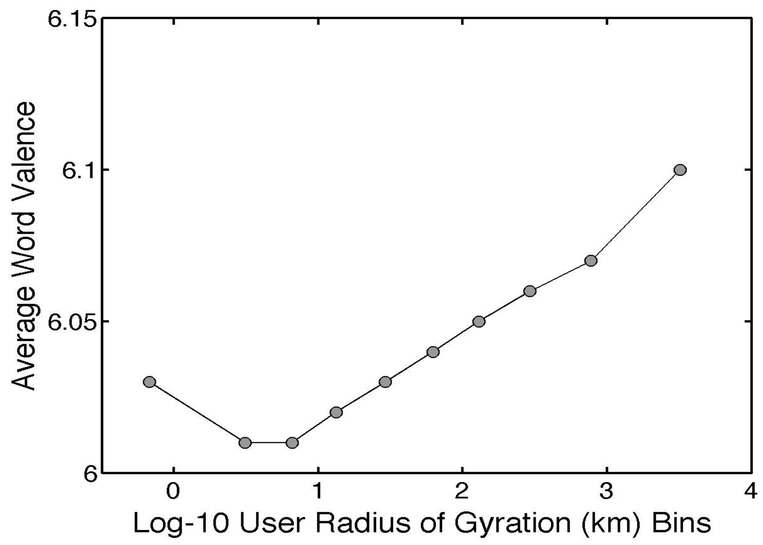
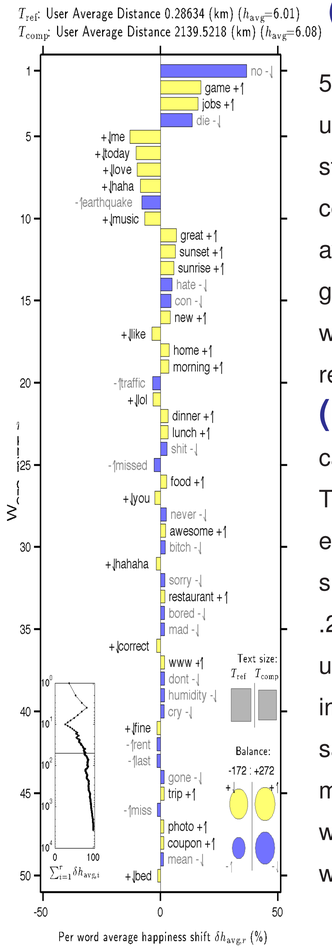
Student Scholars Poster Competition
University of Vermont, October 2012

Movement and Happiness



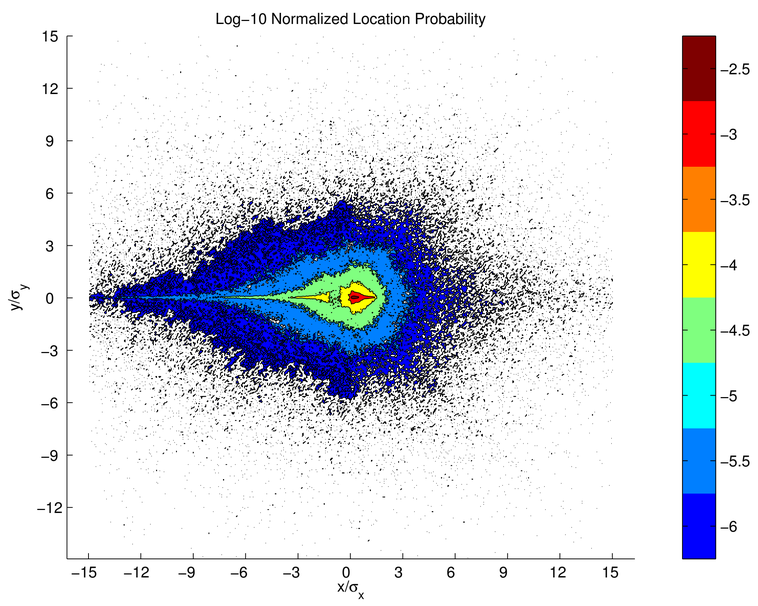


(Above) We took all the Twitter users who had 50 or more geo-tagged tweets. For each of these users, we estimate the radius of gyration using the standard deviation in their positions relative to a center of mass. Grouping the Twitter users by average distance from average lat-long pair into groups of ∼11700 users and finding the average word valence per group, we obtain this scatter plot relating movement and happiness.

(Left) We create Wordshifts to understand the cause for different valence scores between groups. This Wordshift shows difference in word use and the effect this difference had in valence score for the small-gyration group of Twitter users (avg. distance .286 km) and the large-gyration group of Twitter users (avg. distance 2139.5 km). **Yellow** bars indicate a happy word and **blue** bars indicate a sad word. An up-arrow indicates the word was used more frequently and the down-arrow indicates the word was used less frequently by the second group when compared to the first group.

Human Mobility Patterns

(Below Left) We selected users with 30 or more geo-tagged tweets and compared the shape of the users' movement trajectories to the results of an analogous experiment using cellphone towers as reported by González et al.[3]. To do this, we found each user's principal axis of trajectory, that is the axis along which most of the user's movement occurs, and rotated the locations of each user about the user's average location so that all principal axiis point due West. We then normalize the user's tweet locations' distance from the user's average location. This normalization allows us to accurately compare the shape of the trajectory of people who walk to work versus people who drive to work despite traveling different distances. We see that most user's are very likely to be tweeting either from very close to there average location (the origin) or from a secondary bulb along their principal axis of trajectory. There is a separation between the two bulbs indicating that people
are less likely to be tweeting while in transit as when they are at a specific location.



Project Description

- To add to the characterization of how sentiment spreads on a social network, we have collected tweets from Twitter for the purpose of studying how people move and how happy they are.
- We find that there is a strong correlation between how Twitter users move on average and how happy that user's words are on average.
- We find that the shape of Twitter user trajectories correlates strongly with the shape of cellphone user trajectories[3]. We also find that humans spend most of there time around two central locations, which means that human movement patterns can be quite predictable.
- This work will help researchers understand how ideas and sentiment spread throughout a social network, and consequently spread over geographical areas.
- Our research requires a strong background in mathematics and computer science for the purpose of data mining a massive amount of Twitter data, and to analyze the data mathematically.

References and Acknowledgements

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[1] P. S. Dodds, K. D. Harris, I. M. Kloumann, C. A. Bliss, C. M. Danforth. 2011. *Temporal Patterns of Happiness and Information in a Global-Scale Social Network: Hedonometrics and Twitter.* PLoS ONE 6(12): e26752. doi:10.1371/journal.pone.0026752

[2] I. M. Kloumann, C. M. Danforth, K. D. Harris, C. A. Bliss, P. S. Dodds. 2012. *Positivity of the English Language.* PLoS ONE 7(1): e29484. doi:10.1371/journal.pone.0029484

[3] M. C. González, C. A. Hidalgo, A. L. Barabási. 2008. *Understanding individual human mobility patterns.* Nature, Vol. 453, No. 7196. (05 June 2008), pp. 779-782, doi:10.1038/nature06958

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