A Brief Overview of Facebook and NLP

Presented by Brian Groenke and Nabil Wadih

Overview

- Brief History of Facebook
- Usage and Growth
- Relevant NLP Research
  - Facebook Sentiment: Reactions and Emojis
  - Distant supervision for emotion detection using Facebook reactions
  - “Haters gonna hate”: challenges for sentiment analysis of Facebook comments in Brazilian Portuguese
  - Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial
- Facebook APIs
  - Graph API
  - Public Stream API

History

- Launched in February of 2004
- Founded by Mark Zuckerberg and fellow Harvard colleagues
- Initially built and exclusive for Harvard Students
- 2006 - Opened to public for anyone to sign up for
- 2012 - Facebook held its first IPO for $38 per share valueing the company at $104 Billion
- 2012 October - Passed the mark of 1 Billion monthly active users
    - 600 million mobile users
    - 219 Billion photo uploads
    - 140 billion friend connections
    - Provides a lot of data to analyze!
- 2014 - acquired WhatsApp for $19 Billion

Common Uses

- Connect with peers, relatives, friends , etc.
- Share photos and albums
- Make posts
- React to and comment on other people’s posts
- Marketing! Facebook sells targeted advertisements to help promote a product or business
- Create pages for your business, hobbies, etc.
- Plan events and parties
- Groups for linking people of similar interests “OSU Class of 2017”
- Messenger - Facebook’s chat feature for messaging or sharing photos
- Games, News, Videos
- Like pages of celebrities, tv shows, movies, and see where others have common interests
- Birthdays
- Job status, Current place of residence

Facebook is continuing to grow!

Significance of data

Facebook in NLP Research

Relevant NLP Research

Quick search on the ACLWeb.org anthology for “facebook” yields 1,670 results

A Few Examples:

- Facebook Sentiment: Reactions and Emojis
  http://www.aclweb.org/anthology/W17-1102
- Distant supervision for emotion detection using Facebook reactions
  http://www.aclweb.org/anthology/W/W16/W16-4304.pdf
- “Haters gonna hate”: challenges for sentiment analysis of Facebook comments in Brazilian Portuguese
  http://aclweb.org/anthology/W17-3609
- Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial
  https://mental.jmir.org/2017/2/e19/

Facebook Sentiment: Reactions and Emojis

- Research by Ye Tian and Thiago Galery, Giulio Dulcinati, Emilia Molimpakis and Chao Sun
- Emojis are used frequently in social media.
- A widely assumed view is that emojis express the emotional state of the user
- Leads to research focusing on the expressiveness of emojis independent from the linguistic context
- Analyze data of 21,000 posts which contain 57 million reactions and 8 million comments
- Goal was to compare reactions with sentiments of comments from same user
- Argument is that emojis and linguistic text can modify the meaning of each other

Facebook Sentiment: Reactions and Emojis

Researchers Argue that Emojis can interact with text in 6 ways:

1. replace a word/phrase.
   e.g. *I want have a* 🍺.

2. repeat a word/phrase (accenting, adding focus)
   e.g. *Take note* 📝*Sam, this is how you season food, you are almost done there babe. Like you did the chicken* 🍗*the other nights.*

3. express the speaker's emotion or attitude independently.
   e.g. *(Facebook update from survivor of the Florida gay club shooting 2016-06-12): I am safely home and hoping everyone gets home safely as well.* 😭

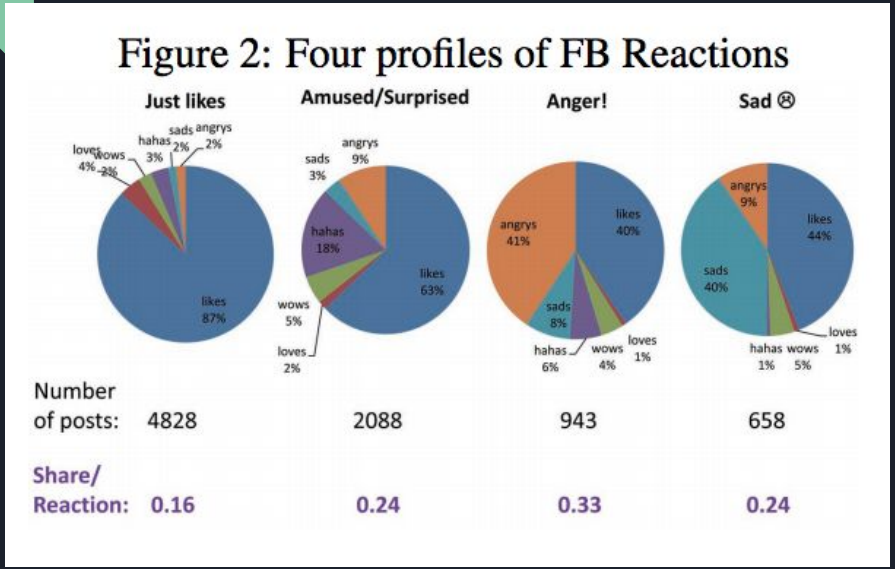
4. enhance/ emphasize an emotion expressed in the text.
   e.g. *This would probably be really good* 😋.

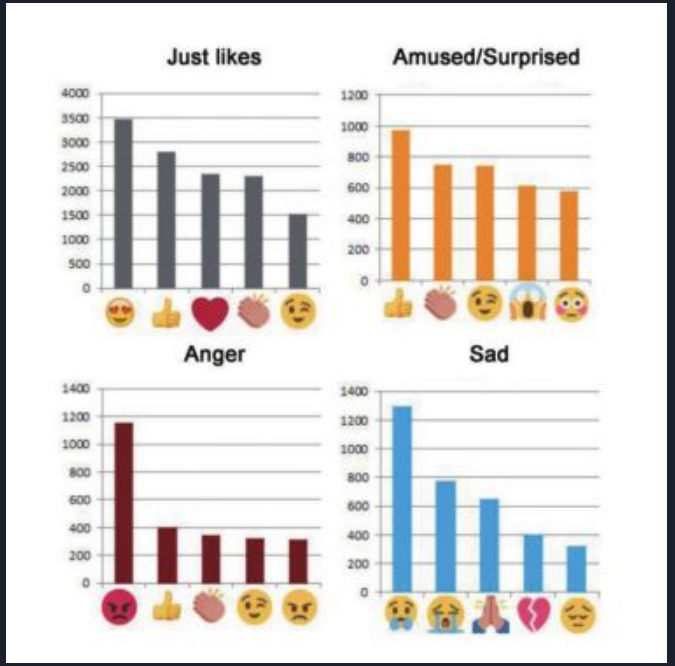
5. modify the meaning of linguistic text (e.g. marking non-literal or non-serious use); implying propositional content
   e.g. *I bet you are enjoying your revision* 😉.

   -A: Would you like to come to my party? -B: 😬

6. be used for politeness.
   e.g. *Can you please cook us something that I tag you in instead of your 4am pastas? Thanks.* 😊

Results and Conclusion





Emoji Comment Distribution by Reaction Profile

- There is a reliable correlation between Facebook reactions and emoji usages suggesting that emojis can be used to detect users sentiment, if we take into account of contexts where their meanings are modified
- Demonstrates facebook reactions and comments are good data source for investigating indicators of user emotional attitudes.

Distant supervision for emotion detection using Facebook reactions

Research by Chris Pool and Malvina Nissim

- Used facebook's reaction feature with distant supervised learning to train a support vector machine classifier for emotion detection
- Tested models on existing emotion detection benchmarks
- Show that "Employing only information that is derived completely automatically" can achieve competitive results

Figure 1: Facebook reactions

Method

- Collected facebook posts and their corresponding reactions from public pages using Facebooks APIs
- Chose different pages trying to obtain a balanced dataset and collected most recent 1000 posts from each page to build the SVM classifier

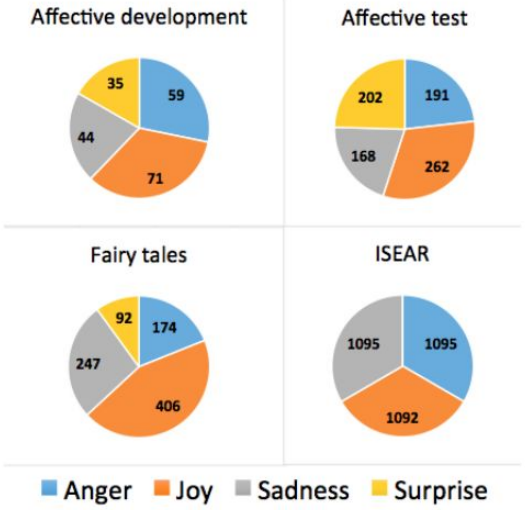


Figure 3: Emotion distribution in the datasets

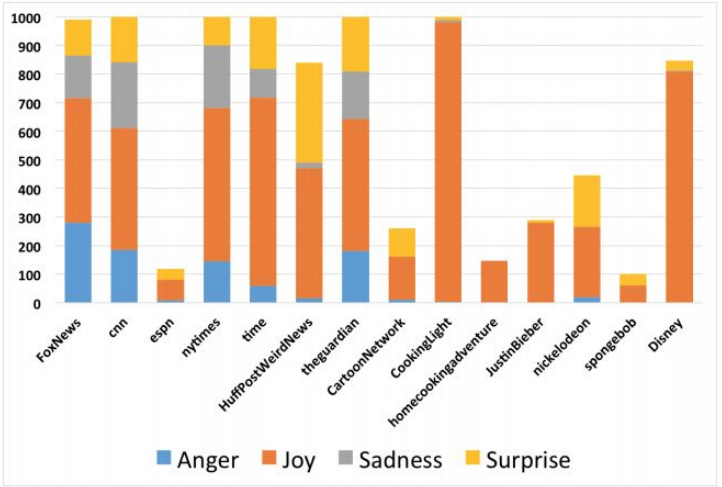


Figure 4: Emotion distribution per Facebook page

Results and Conclusion

- The results varied based on the datasets picked based on facebook pages
- The Affective Text Dataset had the highest precision for all reactions except joy
- It outperformed many existing classifiers in the precision of detecting anger and sadness
- The evaluation on standard benchmarks shows that models trained as such, especially when enhanced with continuous vector representations, can achieve competitive results without relying on any handcrafted resource
- This approach has a lot of potential and lots of room for improvements
- They believe the largest potential lies in the choice of training data both in terms of the pages they pull from and the posts they choose to extract

“Haters gonna hate”: challenges for sentiment analysis of Facebook comments in Brazilian Portuguese

Research by Juliano Desiderato Antonio and Ana Carolina Leatte Santin

Objective

To analyze a corpus of 1,000 Facebook comments drawing upon prior work in Discourse Analysis and Constructive Grammar

Methodology

Comments were segmented into EDUs (Carlson and Marcu, 2001) and manually classified as subjective or objective. Subjective EDUs were manually classified as positive, negative, or neutral.

Conclusion and Remarks

Same words spoken by different people may have polar opposite meanings. Investigation of constructions and idioms may provide improvements for sentiment analysis in discourse.

Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot)

Objective

To “determine the feasibility, acceptability, and preliminary efficacy of a fully automated conversational agent to deliver a self-help program for college students who self-identify as having symptoms of anxiety and depression.”

Methodology

70 students from age 18-28 were recruited from a university community social media site and were divided into two groups. Treatment group (n=34) was given short, daily sessions with Woebot, the authors’ **Facebook** CBT **chatbot**, for 2 weeks. Control group was given an information ebook on depression in college students to review for the same period of time.

Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot)

Results

“Participants were on average 22.2 years old (SD 2.33), 67% female (47/70), mostly non-Hispanic (93%, 54/58), and Caucasian (79%, 46/58)”

“No significant differences existed between the groups at baseline, and 83% (58/70) of participants provided data at T2 (17% attrition).”

“Woebot group significantly reduced their symptoms of depression over the study period as measured by the PHQ-9 (F=6.47; P=.01) while those in the information control group did not.”

Results indicated (with need of replication) that NLP driven chat systems can be used as alternatives for mental health patients that find it difficult to seek in-person care.

Facebook APIs

Facebook **Graph** API

A RESTful API for fetching and posting data to Facebook

Node - “things” i.e. a user, a photo, a comment, etc

Edge - connections between things; i.e. a user post, a photo comment, etc

Fields - information about a thing; i.e. a person’s birthday, a page’s description, etc

“User access tokens” grant apps permission to use the API and restrict access appropriately.

SDK bindings exist for Python, PHP, .NET, Java, and most other widely used languages.

Graph API Explorer: https://developers.facebook.com/tools/explorer/

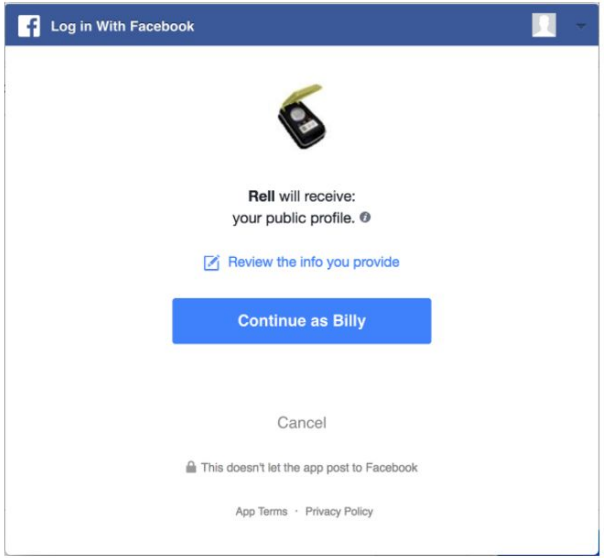
Facebook **Public Feed** API

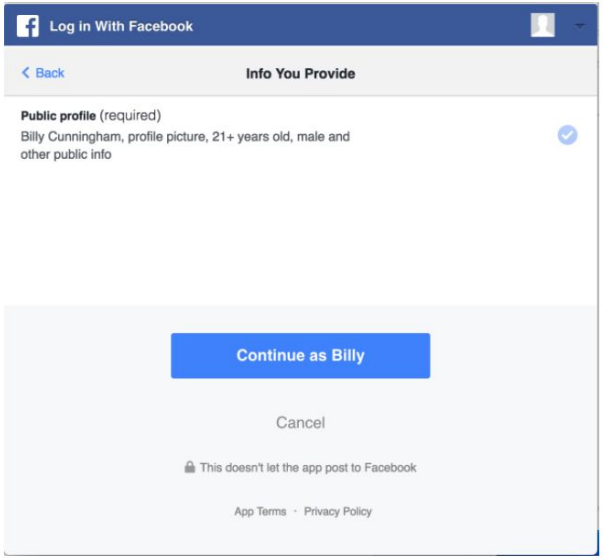
Allows users to receive real time data from the worldwide public feed

- No REST API
- Feed data is sent to user’s server over a dedicated HTTPS connection
- Only basic data about posts are supplied.
- Graph API must be used to query additional information.

Facebook Oauth

- APIs available for incorporating facebook in your own website or app
- Example: Login
  - Most users already have a facebook account so can save you having to create a new account
  - Oauth2.0





Example: Query posts from Elon Musk

```
user = 'OfficialElonMusk'
graph = facebook.GraphAPI(access_token)
profile = graph.get_object(user)
posts = graph.get_connections(profile['id'], 'posts')

try:
    def printJson(post):
        print(json.dumps(post, indent=2))
    [printJson(post) for post in posts['data']]
except KeyError:
    print('No posts available')
```

Python Facebook SDK - https://github.com/mobolic/facebook-sdk

Example: Query posts from Elon Musk

```
(trusty)brian@localhost:/var/host/media/removable/cros-ext/dev/osu-cse/cse5539/facebook-sdk/examples$ python get_posts.py
{
  "created_time": "2017-11-26T05:54:12+0000",
  "message": "Thanksgiving in the Rockies. Love my bro.\n\n \u2014 Products shown: Tesla Premium T-Shirt and Tesla Heavy Blend Hoodie.",
  "id": "1664701767172902_1743207105989034"
}
{
  "created_time": "2017-11-25T13:48:28+0000",
  "message": "Tesla Semi - Stepping into the cockpit..!!\nGet Your Tesla T-Shirt Today and Join the Revolution With Us http://bit.ly/2zbBvuo",
  "id": "1664701767172902_1742939126015832"
}
{
  "created_time": "2017-11-23T14:38:20+0000",
  "message": "Congratulations to the Tesla crew and South Australian authorities who worked so hard to get this manufactured and installed in record time!\nhttp://on.mash.to/2A1HhO4\n\n \u20
14 Products shown: Tesla Premium T-Shirt and Tesla Heavy Blend Hoodie.",
  "id": "1664701767172902_1742213886088356"
}
{
  "created_time": "2017-11-22T14:26:37+0000",
  "message": "Tesla Semi - The Next Generation Electric Truck.\nGet Your Tesla T-Shirt Today and Join the Revolution With Us http://bit.ly/2zbBvuo",
  "id": "1664701767172902_1741844806125264"
}
{
  "created_time": "2017-11-18T15:56:25+0000",
  "message": "Meet the New Tesla Roadster - The Fastest Production Car Ever.\n\n \u2014 Products shown: Tesla Premium T-Shirt, Tesla Heavy Blend Hoodie and Occupy Mars : Limited Edition Tees
 and Merchandise.",
  "id": "1664701767172902_1740417909601287"
}
```

Questions?