

# Can we identify keywords that separate depression from anger?

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# Background

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## Question:

- Can we identify differences in language used by angry posters vs. depressed posters and build a model that can correctly predict depression in a person?

## Method:

- Scraped 1,000 posts (titles and body text) from **r/rant** and **r/depression** subreddits in JSON format
- Used language processing modules and classification models to create a predictive model that results in subreddit predictions, which we use a proxy to determine possible signs of depression

Our model

# Model summary

(Vectorizer: TF-IDF | Classification Model: MultinomialNB)

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$$\text{Recall} = \frac{tp}{tp + fn}$$

$$\text{Recall} = \frac{229}{229 + 16}$$

$$\text{Recall} = 93.5\%$$

	Neg. Actual	<div>TN 203</div>	<div>FP 41</div>
	Pos. Actual	<div>FN 16</div>	<div>TP 229</div>
		Neg. Guess	Pos. Guess

## Rant

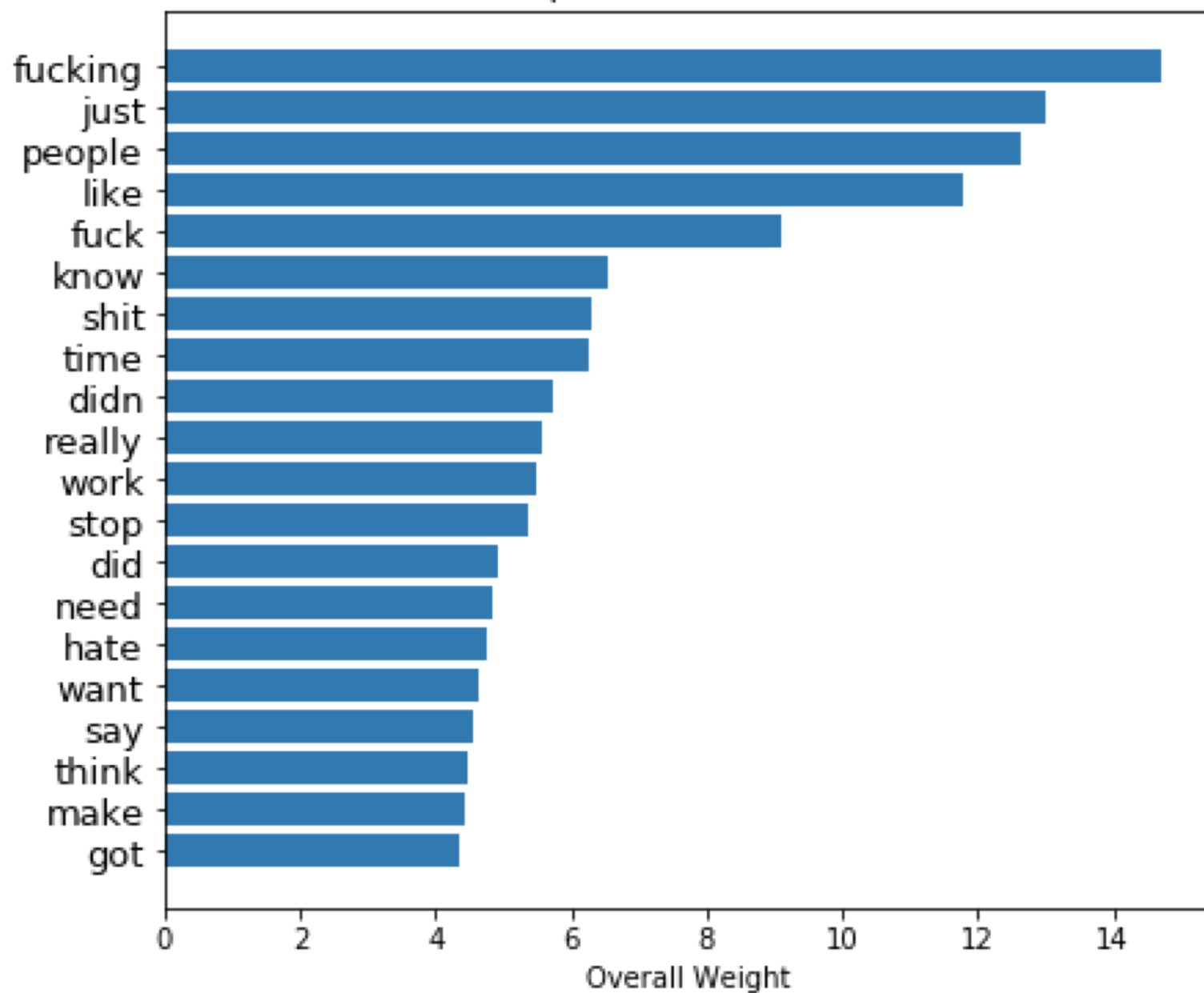
I **just** want a  
burger

## Depression

I **just** want to go  
home

Actual **rant** posts

Top 20 Words in Rant



Get me out of DFW!! Seriously I **fucking hate** Texas - wanna **know** why? 1. The **fucking** heat, I can't even set foot outside in August without it feeling like that a dragon burned the landscape. And in the winter, I yearn for frosty weather but instead sometimes it's like a basketball, the temperatures drive up to 70 sometimes! I can't lose weight in hot weather, it's too hot to have an active lifestyle in the metroplex! 2. Football. Oh my god, the **fucking** fans. If they were autistic I'd be reasonable but these manchilds that go ape **shit** over some stupid obese men dragging a egg-shaped object to a stripe of colored grass is ridiculous. The worst is high school football where everyone worships it like it was a religion. News flash - even ATHEISTS are more appealing than you jerk offs! 3. No one speaks English! Seriously, speak **fucking** English in America! **Stop** trying to **make** it to where we **need** to **know** their language too - they shouldn't even be trying to skip to the border in the first place!! 4. Tattoos - I don't **think** I've been to any other state that's dense with idiots covered in some markings. I find it nasty and ghetto, so stop with the tattoos! Why are they so **FUCKING** COMMON IN DALLAS/FORT WORTH?!! 5. The assholes coughing and sniffing - stop **fucking** doing that in public, especially in college classes! Boo hoo if you **got** allergies GO HOME you **fucking** bitches!

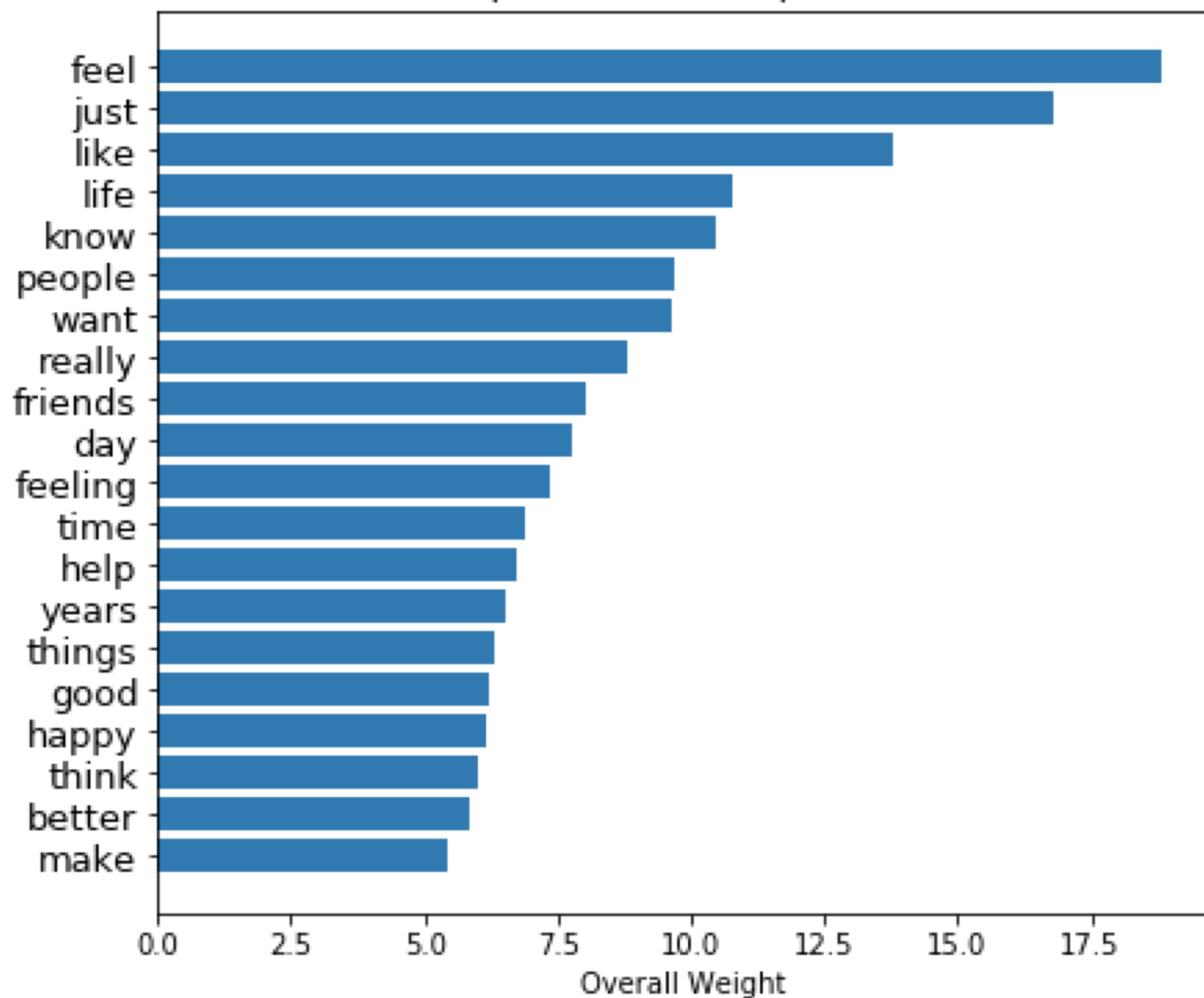
**Apologies: this was the post my model literally ranked highest out of all the rant posts. I like Texas.**



You can buy things on the internet now? So yesterday I bought a new mixer for djing. When I **got** it home I noticed it **didn't** come with the cables I **need** to get sound out of it (which wasn't supposed to be included in the pack being the idiot that I am I **didn't** bother to check). So by the **time** I realise it's 10 to 6 and most of the shops that would sell it would be closed by now. The only shops open in the area that would sell it and were open were Tesco, open until 11 and CEX open until 6. For those not in the **know**, CEX is a shop that buys and sells games, consoles, laptops, phones etc second hand. So with 10 mins I went there first. I ran down there, nearly **got** ran over in the process, **got** to the door just as they're moping up. I come in out of breath and **say** ask the guy if they sell the cables. He starts looking around confused for a minute then **says** "I don't **think** we sell cables actually." Now that's not a problem it was a long shot and it isn't his fault what they do and don't sell. So I **say**, "it's cool man, thought I'd just check" then his next line just **fucking** infuriated me. "The best thing to do is look online" seriously? Does he **think** I'm stupid? Does he **think** I've never heard of buying things on the internet? If I **wanted** them tomorrow, or more likely in a few days, I would have bought them online. It would have been a hell of a lot cheaper,

*Actual depressed posts*

Top 20 Words in Depression



I'm **really** tired... I **want** to end it but I **know** I have to keep going. There is no courage in my body to kill myself. Yet I have no motivation to fix my **life**. I've been gaining weight, my self esteem is gone, I don't care about my hygiene as much. There is just no motivation. My **life** doesn't **feel** worth living anymore and it has been **like** that for **years**. I'm 23 but it **feels like** I'm going to wake up one day and be 30 and be in the same hole. I couldn't keep my job due to my anxiety and the physical fatigue it caused me, I have no idea what I am doing for my future career that will **make** me a living income, I don't drive, and I'm just overall shot. **Like...** it is **really** hard to believe it all gets **better** when I can't even **make** the changes to **make** it **better**. There is no point. I **feel like** I can't do anything and I have no motivation to live this **life** and deal with the whole slave to society aspect. It's just gross and I want to get out of everyone's hair already. I just wish I had the courage. I don't even care about my family. They can be sad all they want after I die. I'll be dead, wherever that takes me.

Double **life** I **feel** as if I'm living a duel **life**, sometimes I'm one person and other **times** I **feel** I act like self destructive. I either have a mode where I'm **feeling good** or alright, **feeling** accomplished and energized for the day. I love talking with friends and **feel** completely relaxed. My other side is being self destructive towards myself, I self loathe myself in **things** I enjoy doing/looking at. I push myself away from everyone and just **feel** pure anger or sadness, it's only one or the other. I **feel** shut in and that I can't trust anyone, I start to get very anxious and paranoid about stuff I do. I do suffer from OCD, autism, anxiety and depression disorders. I'm not sure if this is just it talking or I just can't accept myself and live with myself. I always **feel** I have to put on a fake person whenever I'm out in the real world, but when I go online I **feel** as if I'm someone different and somewhat relaxed at **times**. Internet has always been my safe space to go when I struggle everyday, recently it has been getting worse and starting to wear off of escapism. I just don't get why I can't accept myself for what I like and how I am. Also to stop being so envious and **feel** of hatred to others because I can't stop but compare myself to them in every way and how much of a failure I am. I'm just looking if anyone else is struggling with this and maybe has advice. I do take medicine which works most of the **time** but it's just medicine. I also go to therapy but I **feel** no different and still **feel like life** has no meaning what so ever since we all die anyways. Thanks for reading.

From **r/rant**, but model saw  
**depressed signals**

(false positives)

False positives are OK. They are telling us to look deeper.

			41 false positives

$n = 489$

Car's broken, credit and debit card have been stolen at the gym, I've neglected to purchase notebooks and folders, and college begins tomorrow. I'm in a big mess that's partially my own fault, and I cannot see how I'll fix it by tomorrow. Please, **life**, no more surprises while I'm broke and in college.

**Note: content feels like a depressed person writing; points to non-top-20 elements**



I am not talented, I am skilled! This is something that makes me so mad. I can draw pretty **good**, in fact I studied design and fine arts and I am so happy, that I could make my passion my job. HOWEVER I **really hate**, whenever people see my work and say **things** like "Oh you are so TALENTED". No. It is not talent - it is skill. I **didn't** spend the last 10 **years** drawing until my fingers bled and working my butt off at university to have **people** pass my skill off as just "talent" - That counts for everything in general, I **think**. Talent it just the Aptitude, either you are born with it or not - skill can be acquired by anyone, although "talent" makes it easier for you to progress in that field. Would you tell an architect "Wow, good job in planning that skyscraper, you are so talented!" - Certainly, you won't.

**Note: above is an example of a rant that was misclassified as depression but may not be depressed**

*False positives are OK. They are  
telling us to look deeper.*

From r/depressed, but model  
saw **rant** signals

(false negatives)

We want to minimize false negatives.

I'm **tired** of trying to be better. I wish I could **just** self destruct in peace. I wish I could **just** stop **talking** to everyone who cares and drink myself into oblivion. I regret joining AA. I regret getting therapy. I regret making sober **friends** who care if I drink or not. If I wasn't taking up their **time** (my **friends**, therapist, sponsor) they would have taken someone else under their wing. They would have more time to help people who were better than me and more willing to change. I want to give up. I'm **tired** of trying to get better. It's **fucking** exhausting and I'm **just** so **fucking** tired of it all

Note: want to learn what made the model classify this as a **rant** when there are so many depressed signals

*We want to minimize false  
negatives.*

# Suggestions

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- Tune model to manually increase weights of certain features
- Have model return n-grams of top features
  - Want to see context around our top features
  - Then, add those n-grams or 'phrases' into vectorized corpus so that those n-grams can be analyzed and weighted
- After getting model prediction, review with a finer toothed comb

Thank you.

Questions?

# Appendix

Accuracy and prediction metrics



# Accuracy and prediction metrics

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- **Recall**

the extent to which actual positives are not overlooked

$$\frac{TP}{TP + FN} = \frac{229}{229 + 16} = 93.5\%$$

- **Specificity**

extent to which actual negatives are classified as such  
...false positives are tolerated, if extra compute time is small

$$\frac{TN}{TN + FP} = \frac{203}{203 + 41} = 83.2\%$$

- **Precision**

describes how accurate our model is

$$\frac{TP}{TP + FP} = \frac{229}{229 + 41} = 84.8\%$$

- **Accuracy**

describes overall accuracy of our model

$$\frac{TP + TN}{P + N} = \frac{229 + 203}{229 + 16 + 203 + 41} = 88.3\%$$

# Appendix

Other **r/rant** posts

Phone advertisements on certain free apps are horrible. I loathe certain kinds of phone game ads. The ads are usually fine: showcasing things that happen in the game and such. The annoyance comes from how often I see the ads, but it can also be from something else. I don't **know** what this is called, but let's **just** call it "The Formula". Paid games can suffer from this too. **Just saying**... it's not fun. I am going to use a scenario to play this out. You **just got** this new free app about balloons and protecting it (totally not referencing an app which the ads on it are horrible and im using it as an example). After dying two rounds, you encounter an app. A good 80% of the **time**, the ads will be **like** this. At the top, there will be a sentence about passing a level, but sort of in a meme format. \* Pass level x/Get y points and you're legally skilled \* Can they survive x ys? \* After x tries, I reached level y!! \* Me: (gameplay on one side) My mom/dad/girlfriend/boyfriend/etc: (gameplay on the other side) Can also be Noob: Pro \* Harder than you **think** \* Only x% can get y This would be fine if it literally wasn't almost every single ad. And to top it off, at the end of the ad, you get three choices with game avatars connected to them. Isn't that **just** great?! The worst part is that doing ANYTHING in ANY FREE GAME WITH THIS PROBLEM will most likely cause an ad to appear. This problem has led to certain old apps dying, such as Cut The Rope and Angry Birds 2. If they the producers **want** this amount of ads, they should **JUST MAKE THE GAME BE PAID FOR** INSTEAD OF FREE.

Being on call for nearly every day every week is starting to irk me. Basically, I watch patients, high risk. I'm only supposed to be called in when a technician isn't available or they're busy. The past 2 times not only have I been called in with more than one tech, but they were dead and everybody is on their phones, doing nothing. I've finally got my sleep schedule back to normal so I get up at 4am naturally, do my errands, and I go to bed around midnight. Got called in the moment I get into bed and had to stay at the hospital for patient watch for 12 hours both times. I'm **fucking** exhausted and I have a tendency to fall asleep at the wheel of I'm tired. Tried telling that to my boss, he wants me to walk, which is a temporary fix for maybe 30 minutes. So yeah, I complain because I'm concerned for my health once I go home. Probably me **just** being a bitch but **fuck** this aggravates me.

**Note: because we see few r/rant elements and just as few depression elements, we can assume some elements known to the model and unknown to us are pointing to depression**

pls stop i just so **tired** of due dates and summative stuff due, on top of that are summative performances and exams. Just so sick from the **work**, it keeps on coming like wave after wave. The workload piling up so much that it blocked my view of the light. **friends** and family Expecting me to do well but little do they know that im the black sheep. Getting out of bed is such a pain that i want to go to bed again, not to sleep but to lay there and do nothing. I cant **think** straight with all the weight on my shoulders, i try to look strong by putting on a smile and telling people nothings wrong. so sick of this year, so sick of my life, so sick of all these problems. Just wanna **feel** to be alive again. Sorry if this dont make any sense, i needed to *rant*.

**Note:** did the model assume the word '*rant*' made it from a rant?