

# Socially Generated Positive Reinforcement on Twitter

Jacob Johns

## Bluesky buzz: Why the social media platform is being called the next Twitter

Why some major politicians and celebrities are turning away from Elon Musk



## Elon Musk Talks Twitter, Censorship and the 'Woke' Virus' on 'Real Time With Bill Maher'

Tech billionaire Elon Musk appeared on "Real Time With Bill Maher" to discuss ownership of Twitter.



## Six months into Elon Musk's Twitter: The fall of verification and birth of Twitter Blue in one very long chart

In the six months since Elon Musk completed his acquisition of Twitter, the billionaire has turned the platform on its head by overhauling...



## NYC transit agency pulls the brake on Twitter service alerts

The transit authority that runs subways, commuter trains and buses in New York City is



## Elon Musk rolls out paywall for Twitter's data



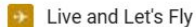
## Elon Musk not 'singular solution' for Twitter after all, says Jack Dorsey in reversal of earlier support

Twitter co-founder Dorsey wrote on Bluesky Friday that "it all went south" and Musk



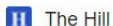
## Twitter is complying with more government demands under Elon Musk

It's been exactly six months since Elon Musk took over Twitter, promising a new era of



## Air France Boyc

Air France has stoppe



## Musk te he's be

Elon Musk said he considers himself a moderate, addressing claims that m



## Twitter search is now only available to registered users

Another day, another change at Twitter – and hints of many, many new features to come. Twitter used to offer a search field even to...



## ter and his own reputation in 6

er, he promised to make the company "better or bots,...



## at Blue Check Stunt



# Twitter

Extrinsic; coming from  
followers or otherwise

Adding a stimulus

# Socially Generated Positive Reinforcement on Twitter

A stimulus used in effort to  
make a response happen  
more frequently

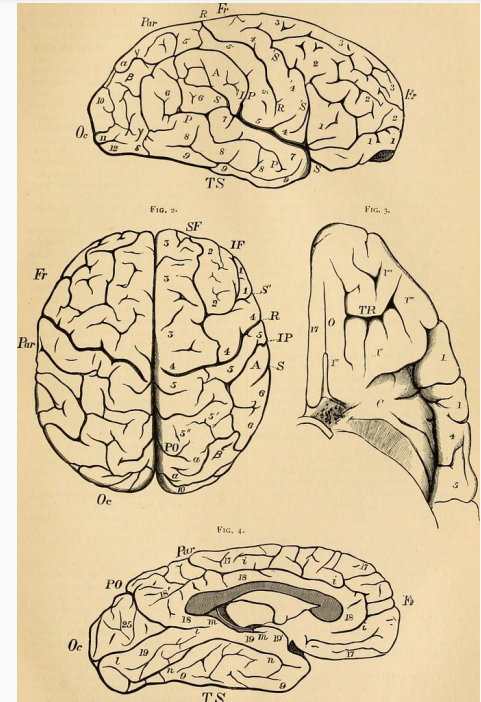
# Psychological Foundings

## Behavioral Therapy

- Stimulus → Response
- Positive vs. Negative
- Reinforcement vs. Punishment

## Addiction Theory

- Dopamine release and dependence
- Craving growth
- Affects executive functions



# Dataset

## Twitter API

- 2 pulls- March and April
- Random users
- Pulled history of each user
- Hours since last post

## Size:

11,000 observations with 22 features



# Preprocessing

## Feature Extraction

- Omitted redundant, sparse or inapplicable data

## Outliers

- 3-sigma
- Eliminated 1000 tweets

## Aggregation

- Consolidated tweet times across each user

## Discretization

- Media, user mentions, reply

## Curse of Dimensionality

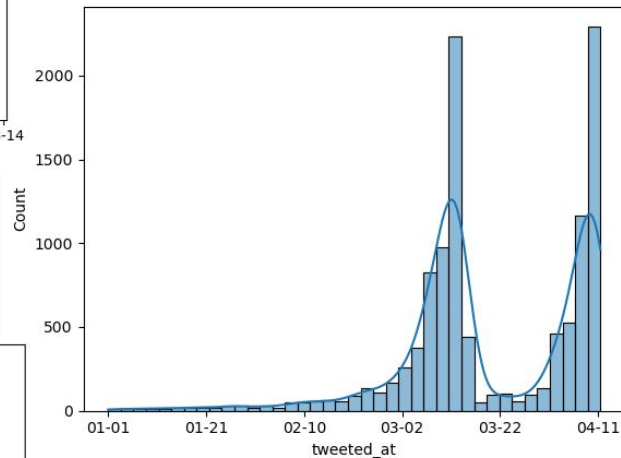
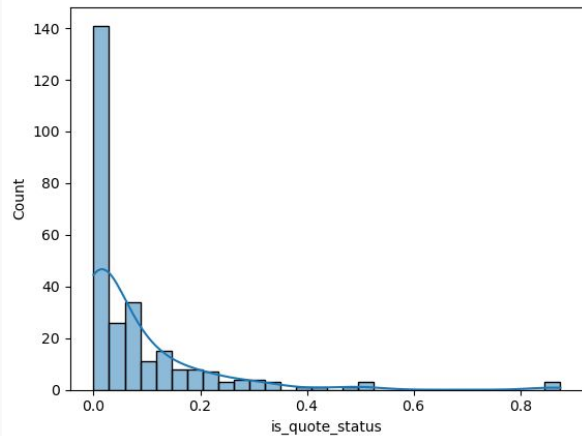
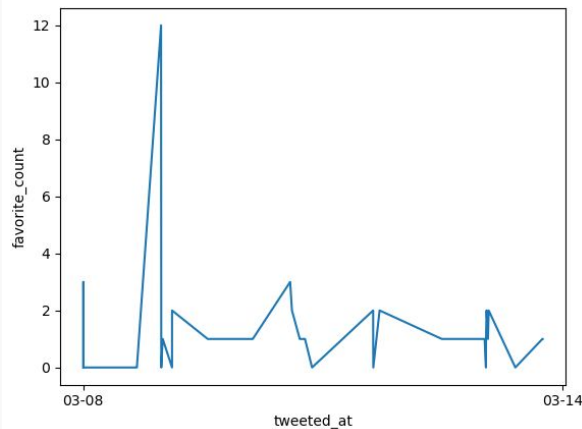
- Features were not highly correlated

# Trends and Visualizations

Tweet pattern for

- A random user
- All users

Quote status distribution

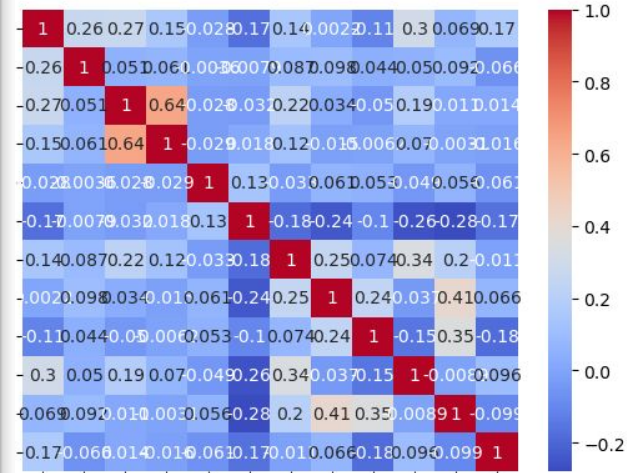
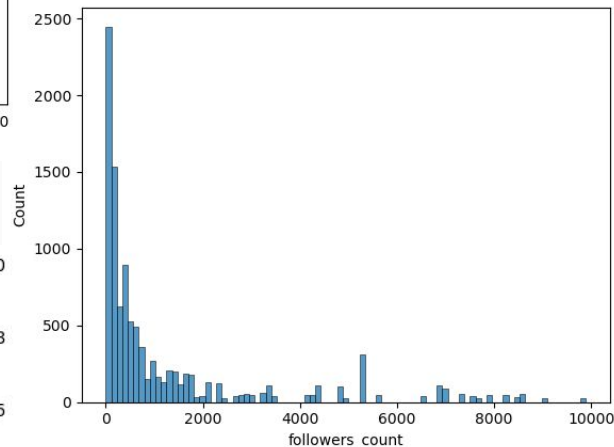
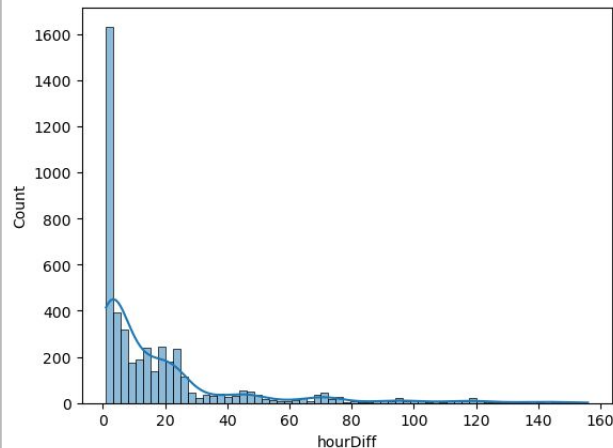


# Trends and Visualizations

Time delay in Tweets

Follower distribution among users

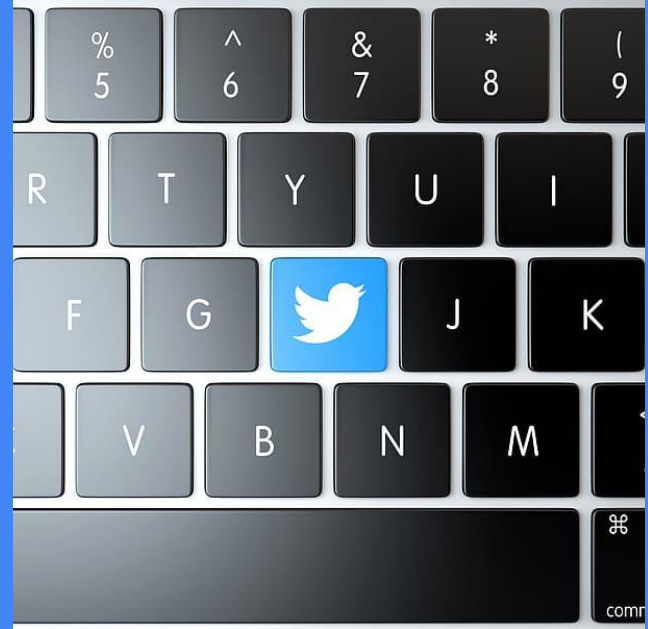
Feature correlation in data





# Secondary Analysis

Demographic Analysis  
T-tests



# Demographics

Utah	423
Music wonderland	308
Canada	279
United States	206
Utah, USA	183
...	
New Delhi, India	2
Toronto	2
Maryland. Again.	2
Saxony, Germany	1
Ottawa, Canada	1

# Sensitive Tweets

Metric:

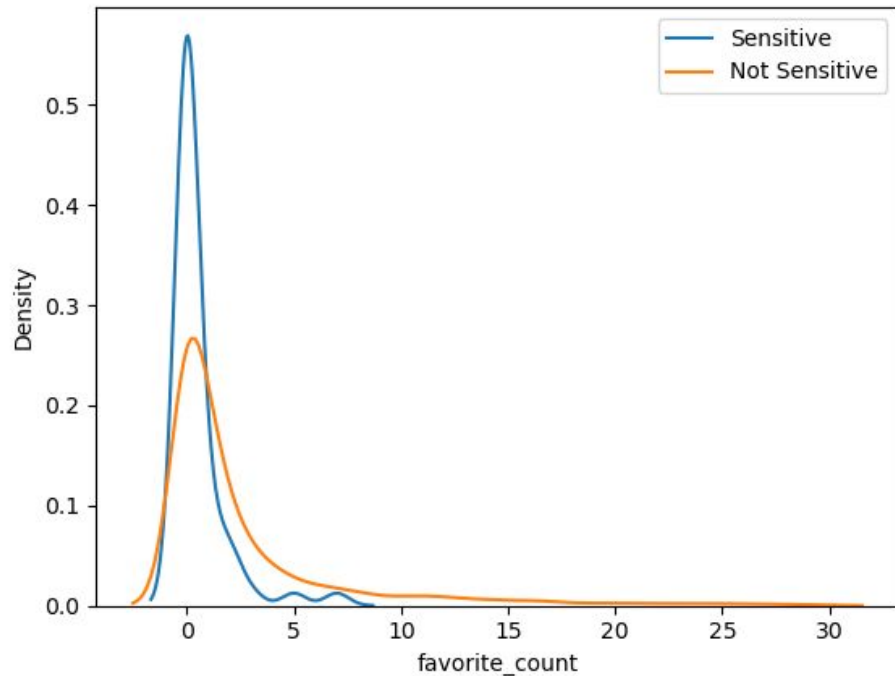
- Number of favorites

Means:

- Safe - 2.5 favorites
- Sensitive - 0.5 favorites

Fit:

- T-test p-value of  $6.5 \times 10^{-18}$



# Tweets with Media

Metric:

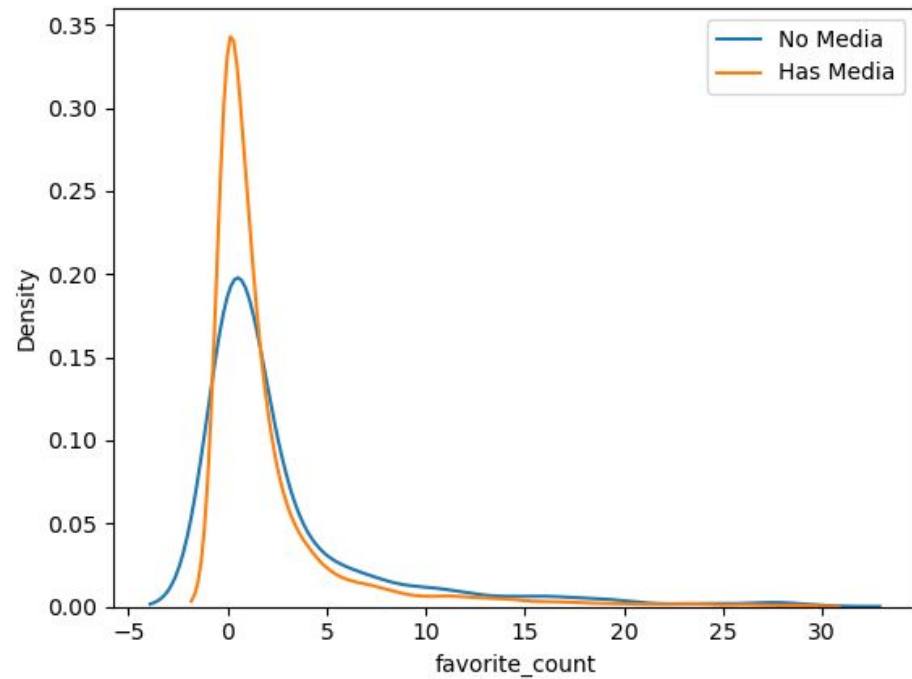
- Number of favorites

Means:

- Media - 1.99 favorites
- No media - 2.82 favorites

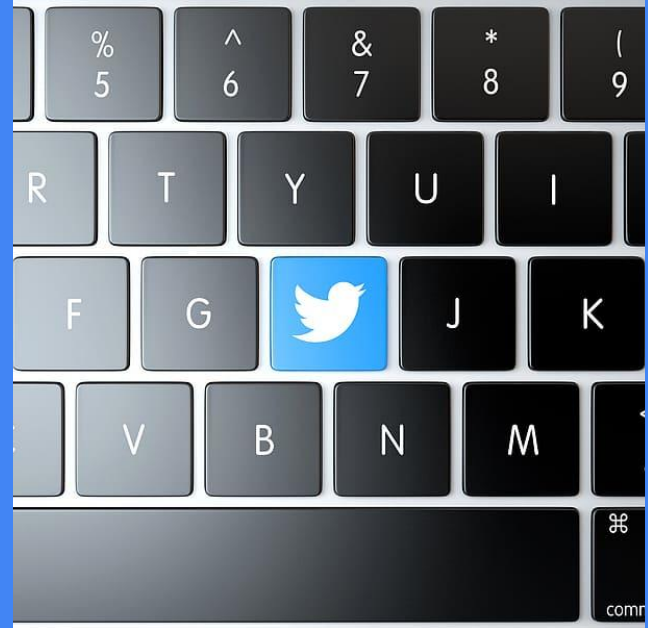
Fit:

- T-test p-value of 4.7 e-6



# Primary Analysis

Single Linear Regression  
Multidimensional Regression  
Prediction Models  
MLP Neural Net



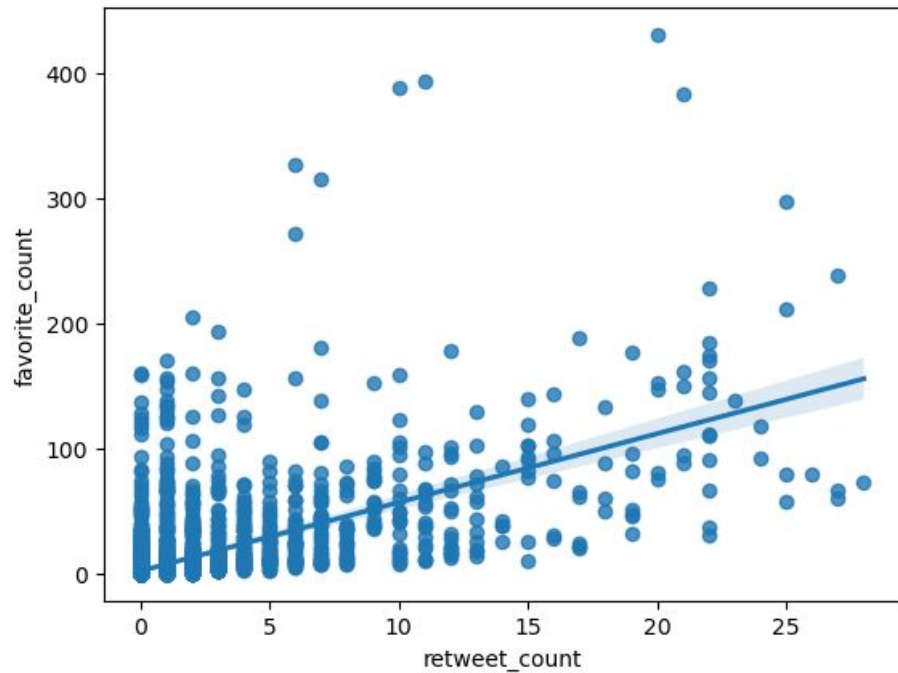
# Linear Regression

Favorites and Retweet correlation:

- Directly proportional
- Favorites  $\approx 5.5 \times \text{Retweets} + 2$

Not very high confidence, nor precision on test data

- Correlation - 0.64
- $R^2$  - 0.45



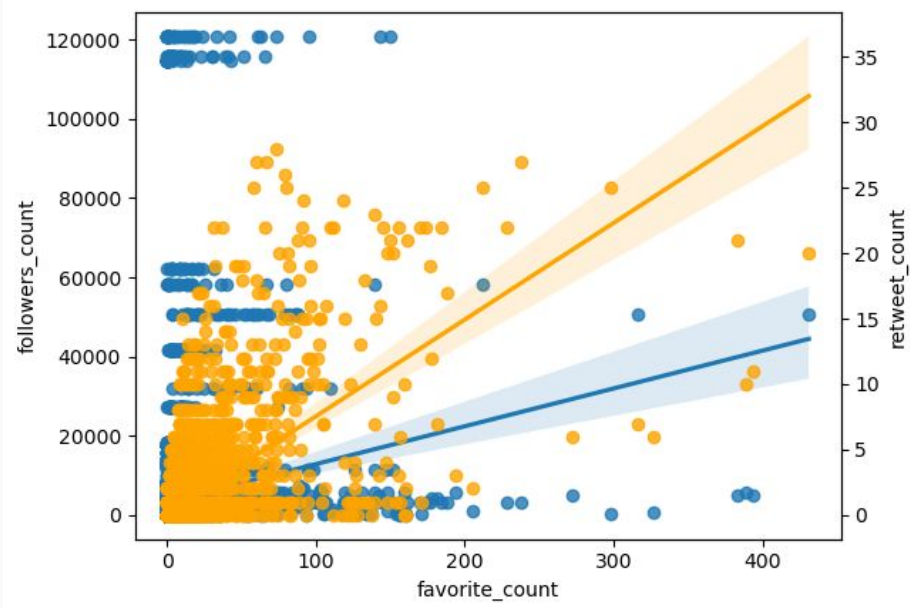
# Two dimensional Regression

Favorites, Retweets and Followers correlation:

- Directly proportional
- Favorites  $\approx 5.36$   
 $\times \text{Retweets} - 0.00002 \times \text{Followers} + 2$

Not very high confidence, nor precision on test data

- $R^2 - 0.48$



# Prediction Model: Multidimensional Regression

Retweets, favorites, followers, friends, user posts

- High dimensional linearity assumed

Performed poorly

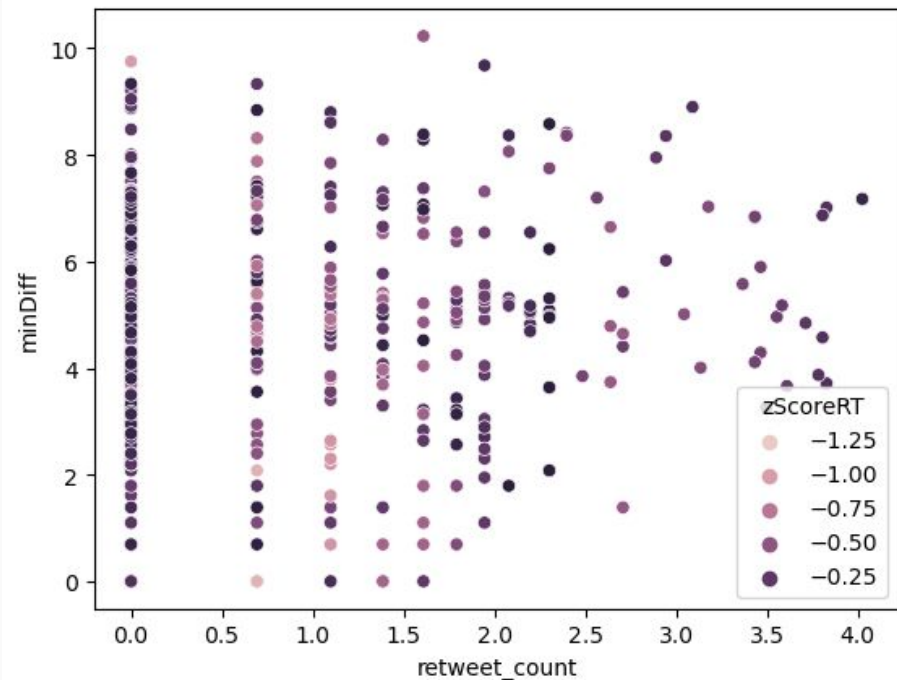
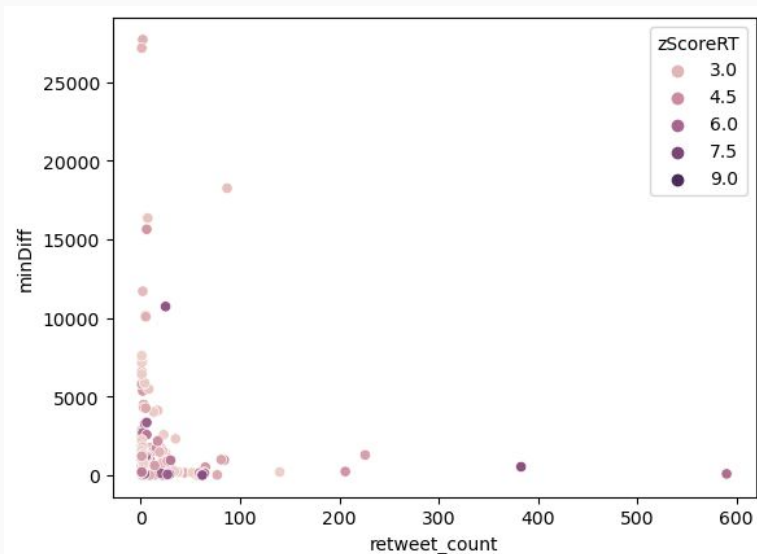
- $R^2 = 0.013$

OLS Regression Results						
Dep. Variable:	hourDiff	R-squared:	0.015			
Model:	OLS	Adj. R-squared:	0.014			
Method:	Least Squares	F-statistic:	24.88			
Date:	Tue, 02 May 2023	Prob (F-statistic):	1.83e-29			
Time:	08:33:42	Log-Likelihood:	-44375.			
No. Observations:	10140	AIC:	8.876e+04			
Df Residuals:	10133	BIC:	8.882e+04			
Df Model:	6					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	8.9522	0.257	34.778	0.000	8.448	9.457
retweet_count	0.7343	0.125	5.861	0.000	0.489	0.980
favorite_count	-0.0509	0.014	-3.562	0.000	-0.079	-0.023
followers_count	3.003e-05	1.49e-05	2.010	0.045	7.38e-07	5.93e-05
friends_count	-0.0002	0.000	-1.042	0.297	-0.000	0.000
favorites_count	-3.818e-05	8.81e-06	-4.334	0.000	-5.54e-05	-2.09e-05
statuses_count	-6.657e-05	1.04e-05	-6.427	0.000	-8.69e-05	-4.63e-05
Omnibus:	8435.114	Durbin-Watson:	2.021			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	183472.693			
Skew:	4.049	Prob(JB):	0.00			
Kurtosis:	22.201	Cond. No.	4.41e+04			



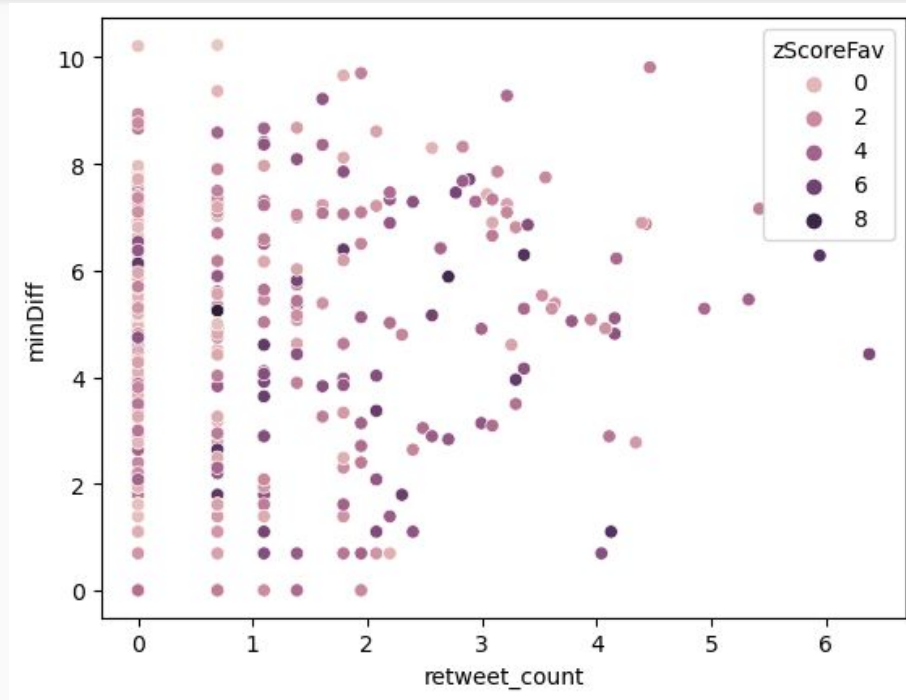
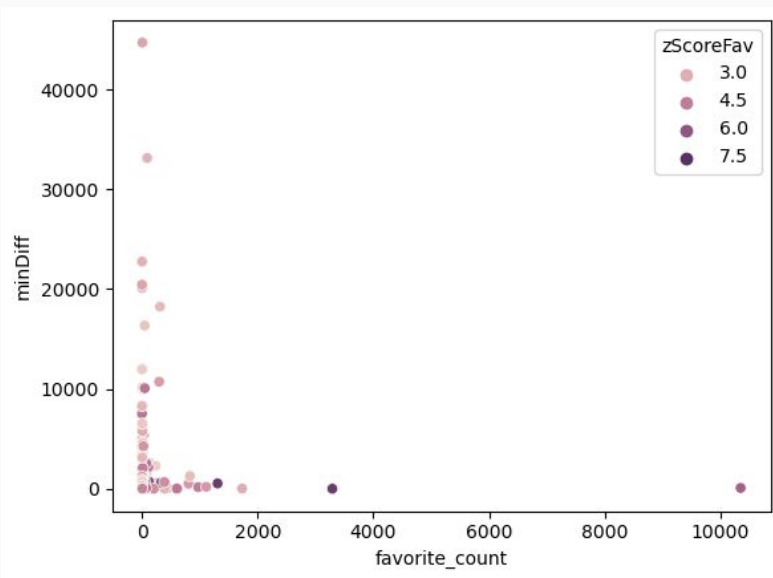
# Exponential decay

Metric: Retweets  $2\sigma$  above user mean



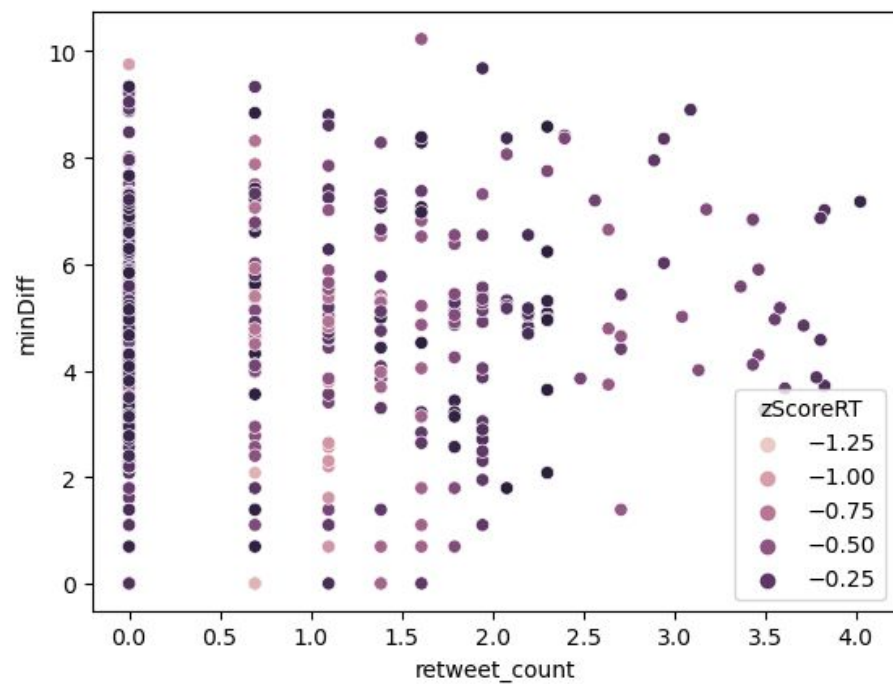
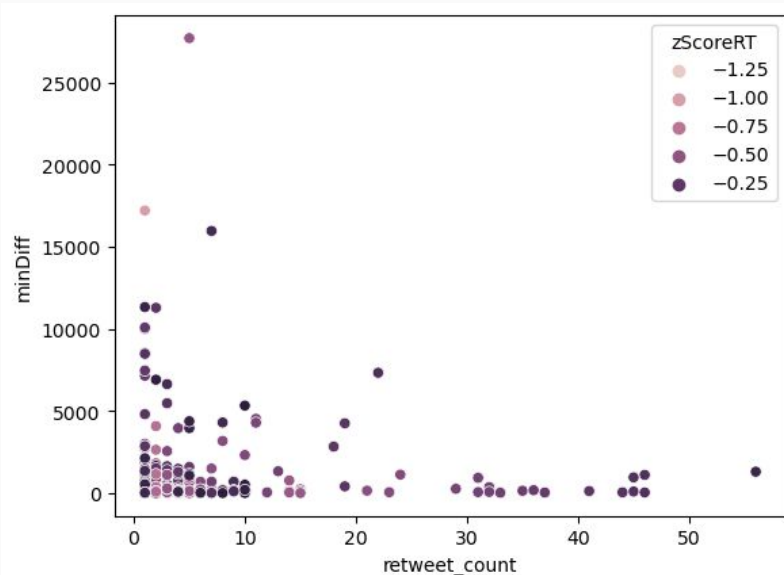
# Exponential decay

Metric: Favorites  $2\sigma$  above user mean



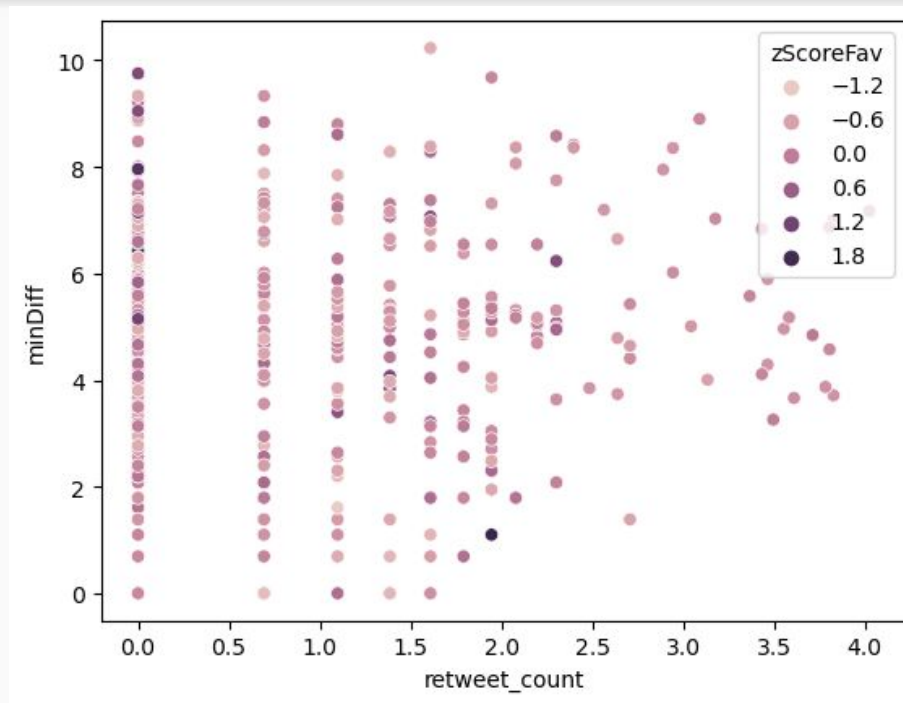
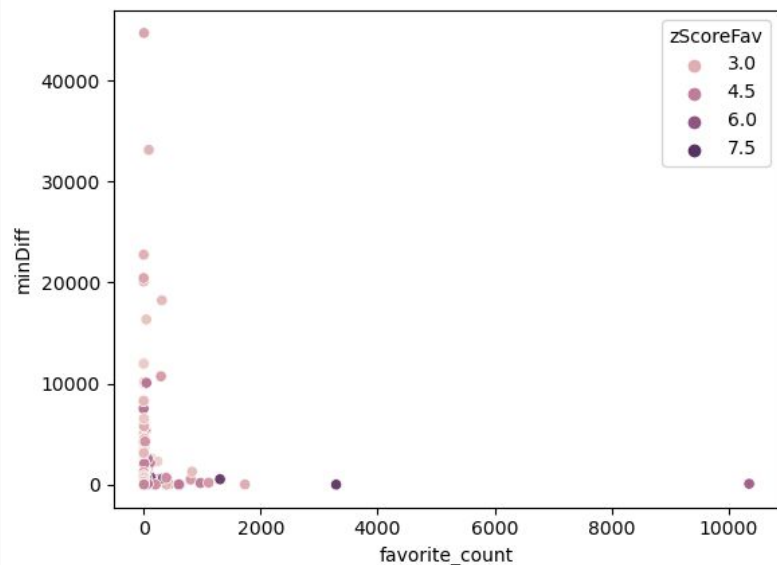
# Exponential decay

Metric: Retweets below user mean



# Exponential decay

Metric: Favorites below user mean



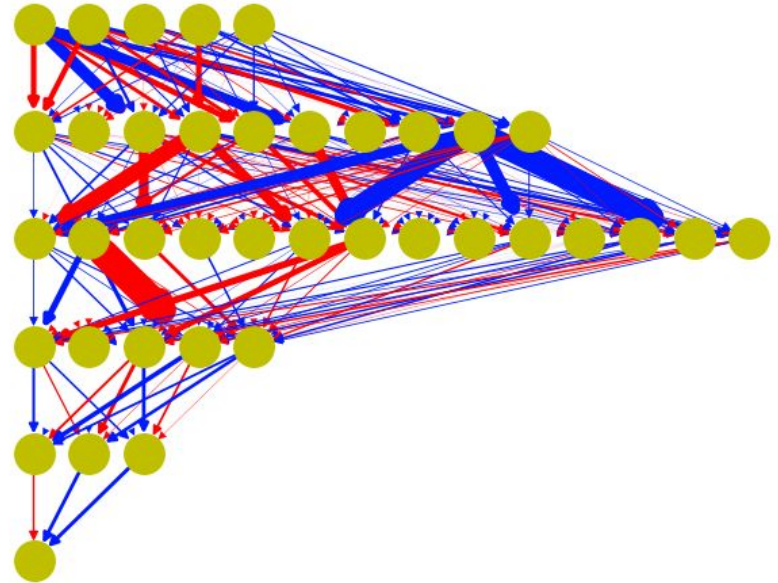
# MLP Neural Net

Multilayer Perceptron regressor

- 4 layers
- Sublayers of 10, 14, 5 and 3

Performance

- $R^2$  - 0.016
- MSE - 6,983,365



# Conclusion

Modeling human behavior is difficult

Not enough support



# Thanks!

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<https://github.com/jakeat555/CS5850-Final-Project>

