

Understanding COVID-19 Vaccine Hesitancy: Evidence from Quora

Sangpil Youm¹, Souhyun Jang², Yong Jeong Yi³

¹Department of Computer & Information Science & Engineering (CISE), University of Florida

² Department of Sociology, Korea University, Seoul, South Korea

³Department of Data Science, School of Global Convergence, Sungkyunkwan University, Seoul, South Korea

Email: ¹youms@ufl.edu , ²soujang@korea.ac.kr , ³redpapa01@skku.edu

Motivation

- COVID-19 Vaccination rate gradually increased, but vaccine hesitancy occurs at the same time.
- Previous vaccine hesitancy Studies have focused on individual characteristics
- Social media can be appropriate source for identifying the public's perceptions and attitude toward COVID-19 vaccine

Objectives

- Discern the threshold of COVID-19 vaccination hesitancy.
- Examine discourse around COVID-19 vaccination hesitancy

Method

Retrieving

- Query term “Vaccine” for June 2020- June 2021
- Only including “COVID” in Questions
- 3,592 Questions, 66,820 Answers

Preprocessing

- Lowercasing
- Lemmatization and Tokenization

Analyzing

- Word2Vec
- Sentiment Analysis with BERT (Pre-training of Deep Bidirectional Transformers for Language Understanding)

Discussion

Positive sentiment	Negative sentiment
safe	early
plan	variant
state	scientists
choice	booster
best	cost
deaths	mutations
new	second
able	type
Canada	information
majority	issue
force	research
nations	evidence
clear	Trump
USA	news
help	effectiveness

- Positive adjectives shown in positive peaks indicate that people desire **”before-covid” daily life** through vaccination
- Negative adjectives shown in troughs imply that the main concern in vaccine hesitancy is **lack of efficacy against variants**

Representative comments

Positive Adjectives

Safe

...t is a **safe** vaccine. Anti-vaxxers are doing their best to overhype claims that it is not **safe**, but it has been used on over 200,000 people now without any significant negative effects...

Plan

... Vaccinated people can, however, begin to make **plans** for 2021 and look forward to resuming aspects of the old normal as more and more people get vaccinated ...

Able

.... Personally, I would encourage everyone to get the vaccine as soon as they're **able** to, although it's ultimately your decision...

Negative Adjectives

Early

...The problem right now is that those people might not have gotten their second shot yet, or might have gotten infected right before being vaccinated. It's too **early** to get any reliable data, give it half a year and we won't even need data to know if they were effective...

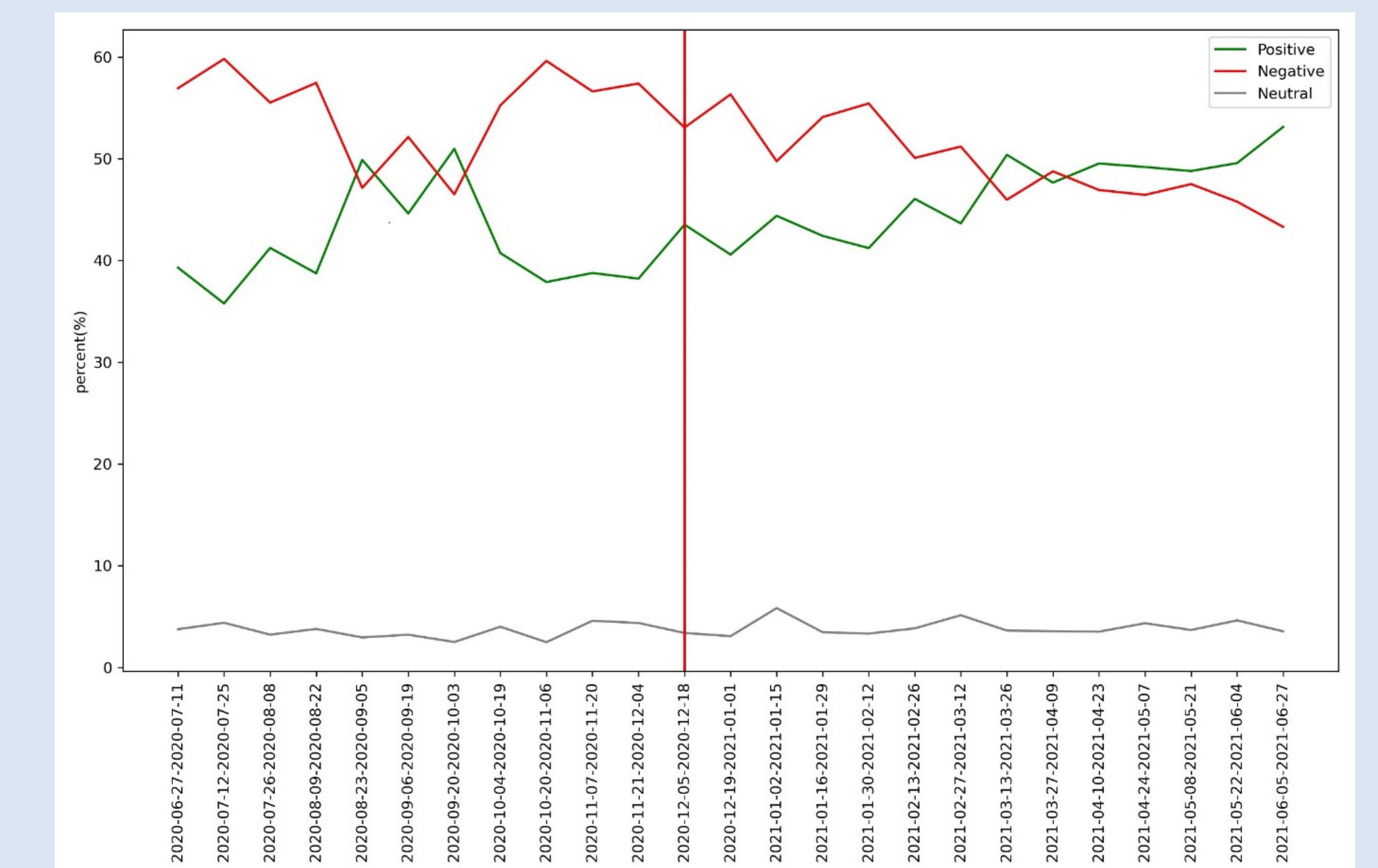
Variant

...This is why despite of vaccinating 97 million people yet the vaccination is facing issues of shortages, lack of evidences against new **variants** for which bridge trials are going on and dearth of vaccine makers to join Covax a global vaccine alliance ...

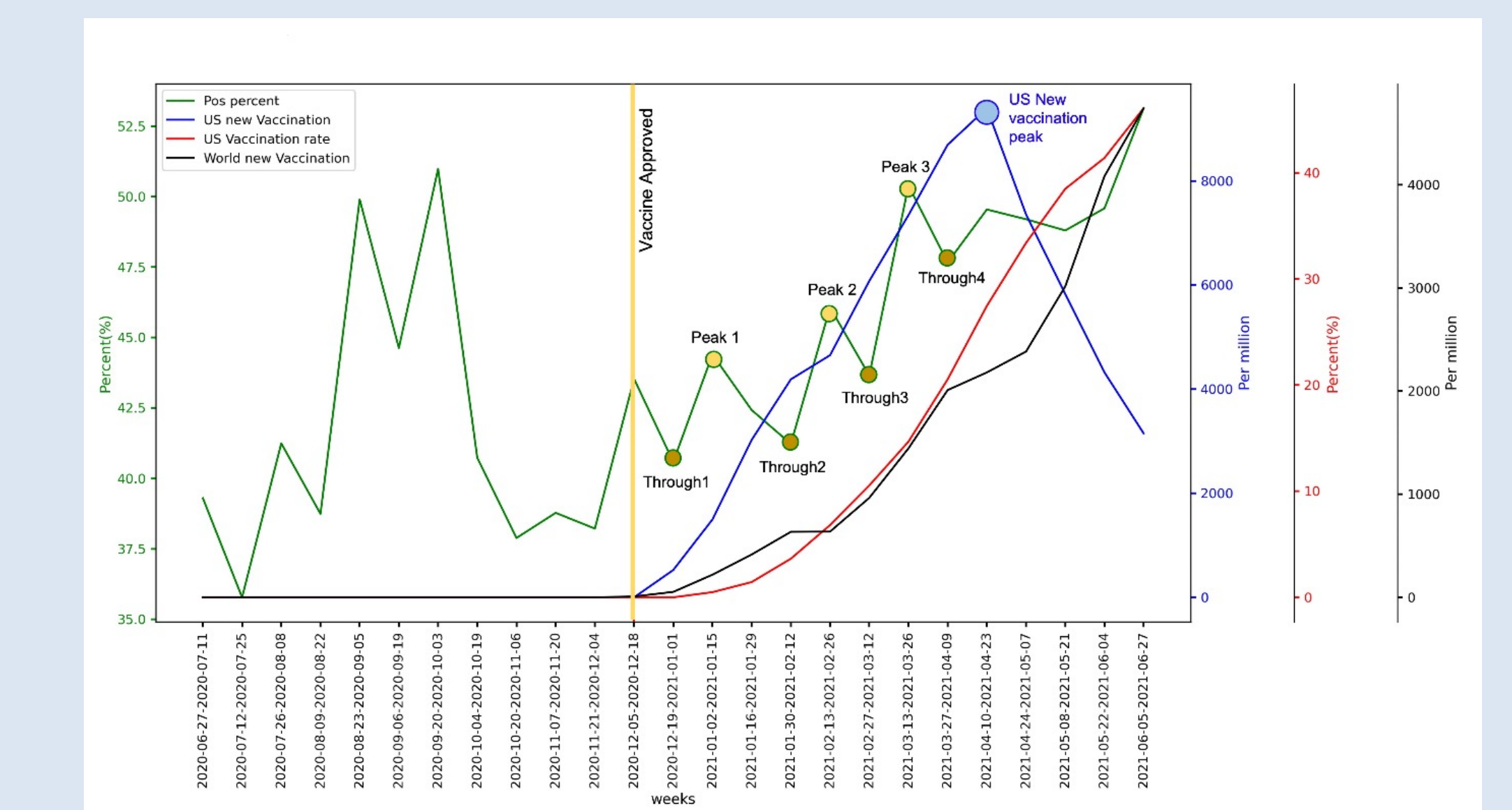
Mutation

...Each individual infection is another opportunity for viral **mutation** and if the virus mutates to the point where the vaccines can no longer recognize it, then it could become a cat and mouse game between variants versus vaccine **boosters**/modifications...

Result



- Before Vaccine released**, the proportions of positive and negative sentiment fluctuated
- After Vaccine released**, the overall negative sentiment over vaccine decreased and positive rates increased



- Ceiling point** of new COVID-19 vaccination occurred when **27.46% of the US population** had been vaccinated
- Positive sentiment increased**, the number of **new vaccination increased** until it reached the ceiling point

Vaccine semantic close words

Positive adjectives (shown in peak points):
safe, best, able, plan. help

Negative adjectives (shown in trough points) :
early, variant, mutations, effectiveness