COVID-19 Vaccinations

Tweet Sentiments & Vaccination Progress

28th April 2021

Birte Balzer, Christoph Michel

Key Objectives

1. Analyze and visualize the start of the vaccination progress worldwide

2. Patterns in vaccination tweets: numbers and sentiments

3. Connections: vaccination progress and vaccination tweets
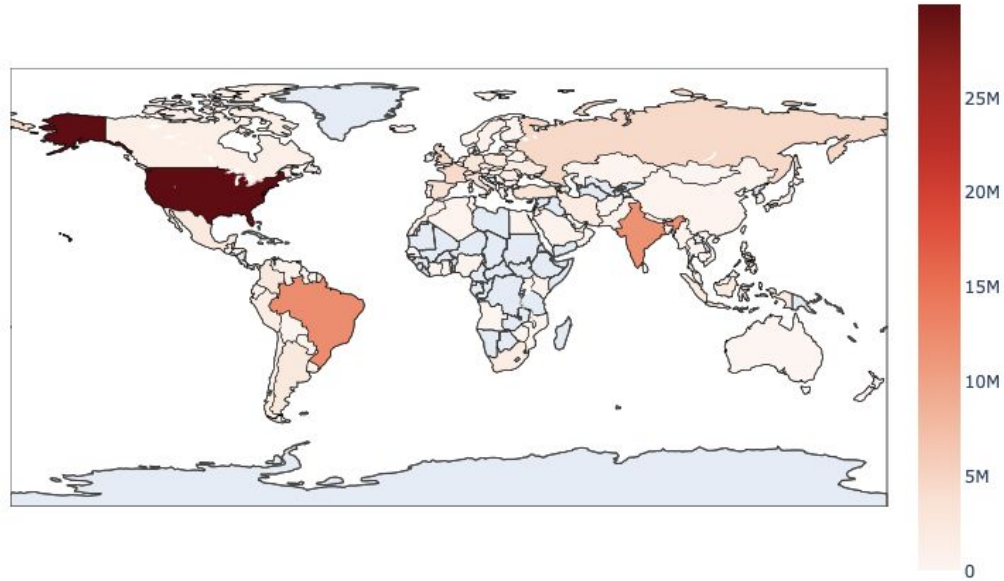
I. Vaccination Progress

13-12-2020 to 24-03-2021

Vaccination Progress Data Set

- Kaggle Data set "Covid-19 World Vaccination Progress"

  - 8079 observations for daily & total vaccinations

  - 147 countries
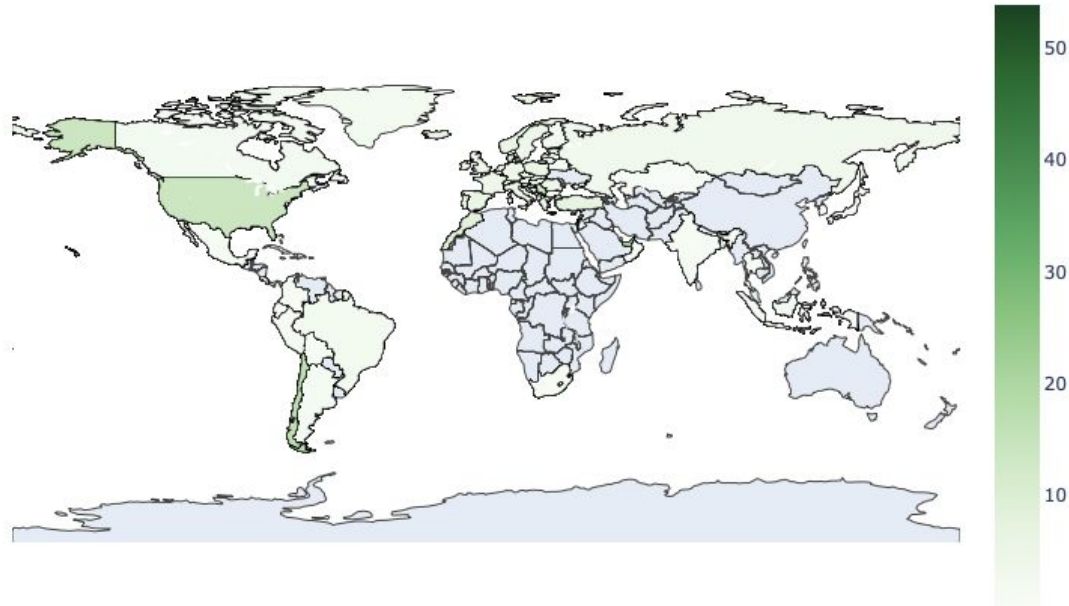
  - 13-12-2020 to 24-03-2021

1. Infections

Total cases of Covid-19 infections worldwide, 23.03.2021

Worldwide Covid-19 infections until 23rd of March 2021
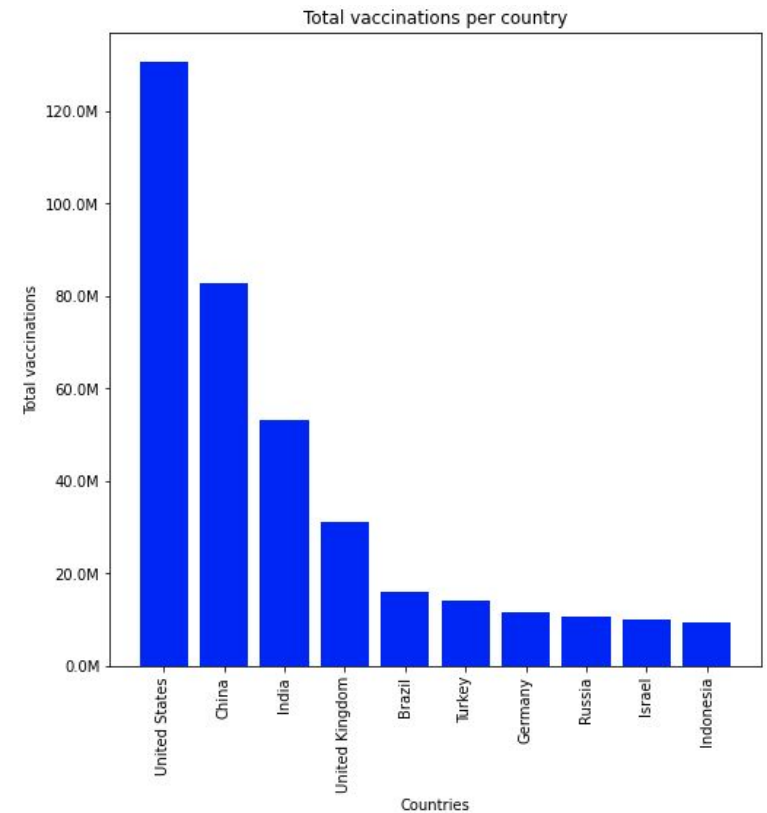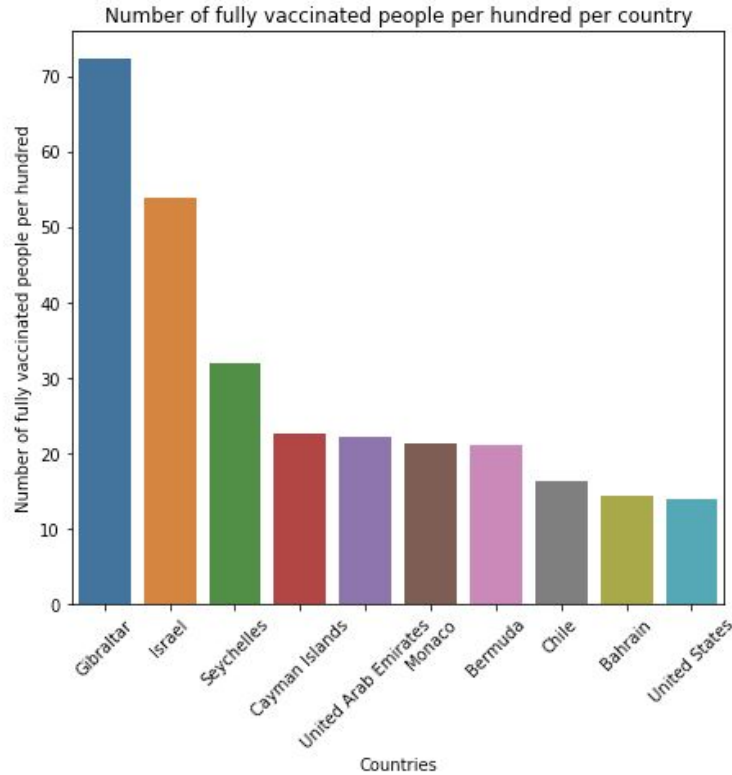
2.Vaccination overview

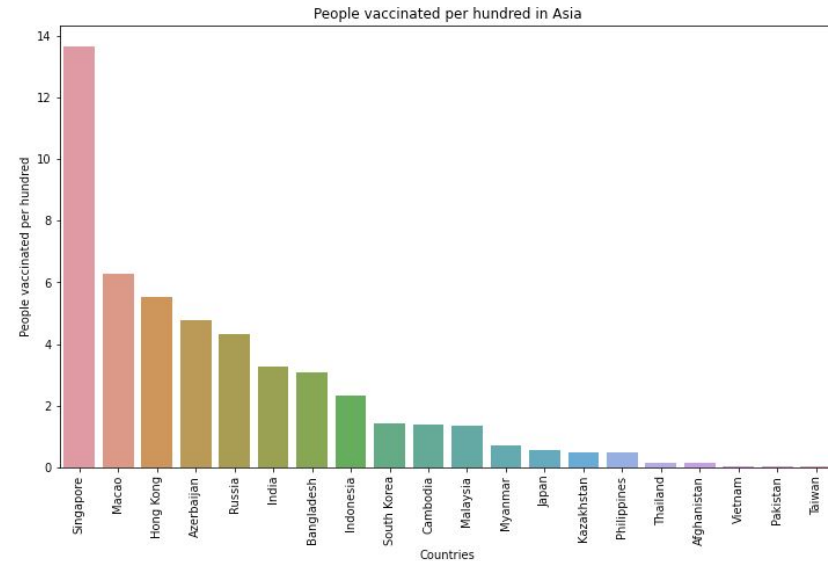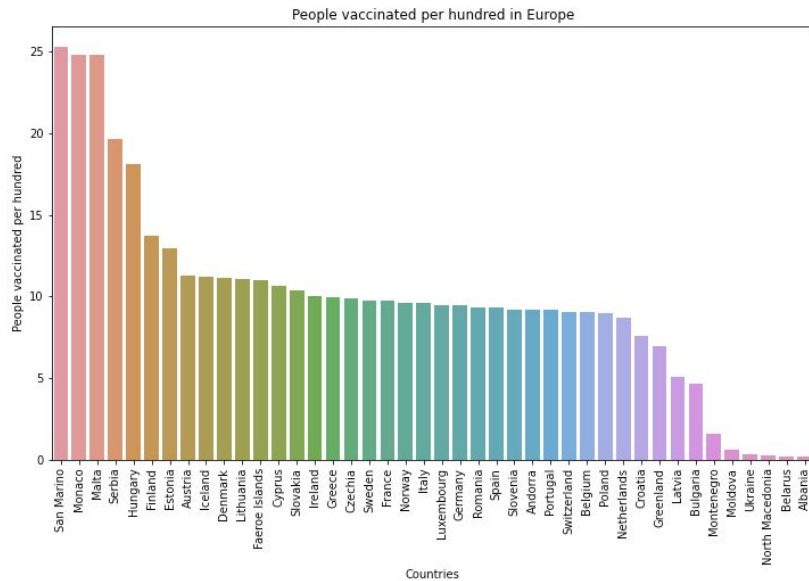People fully vaccinated per hundred, 23.03.2021

Vaccinations efforts

Total vaccinations per hundred worldwide
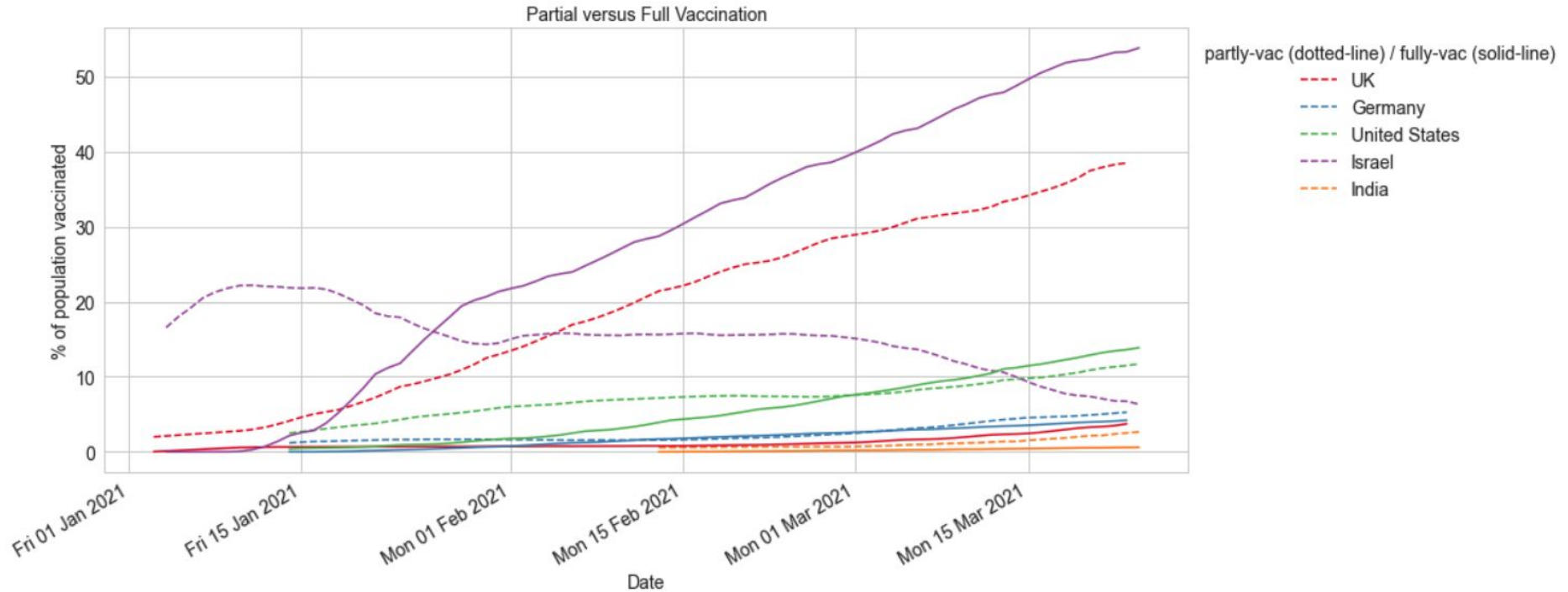
3.Vaccination progress in detail

Vaccinations efforts

People vaccinated per hundred vs. total people vaccinated

People vaccinated per hundred in Europe

People vaccinated per hundred in Asia
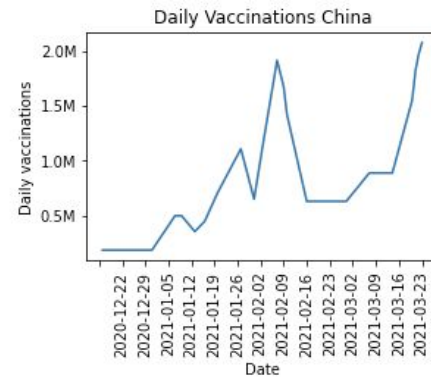
Vaccinations efforts

by regions

Partial versus Full Vaccination
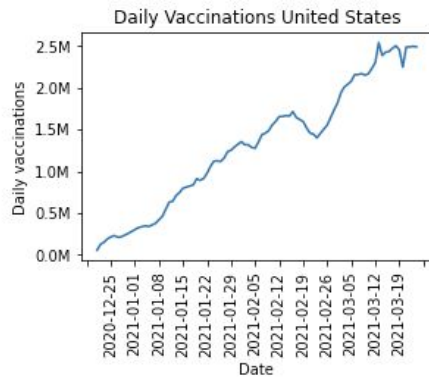
ISRAEL - highest percentage of population fully vaccinated
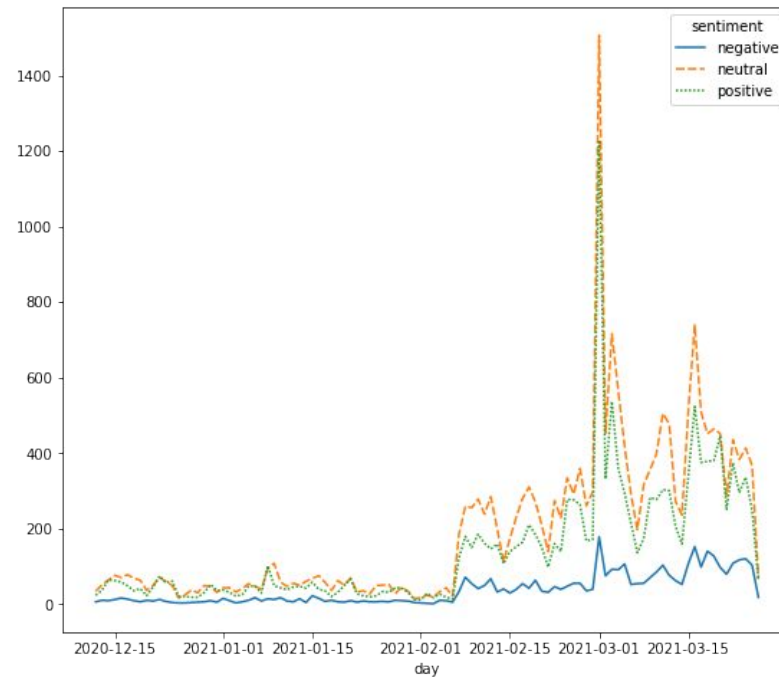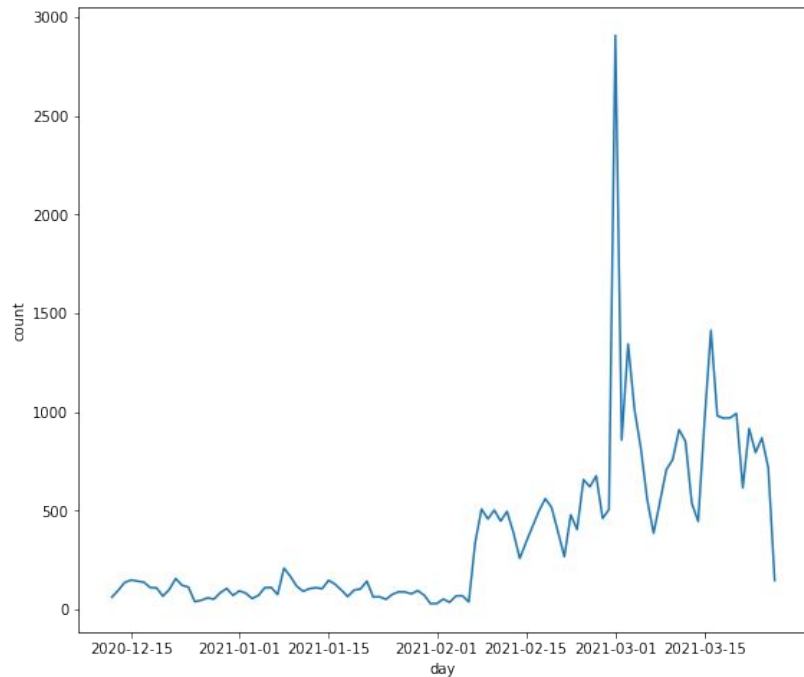**UNITED KINGDOM** - priority for partial vaccination over full vaccination
INDIA - lowest percentage of population vaccinated
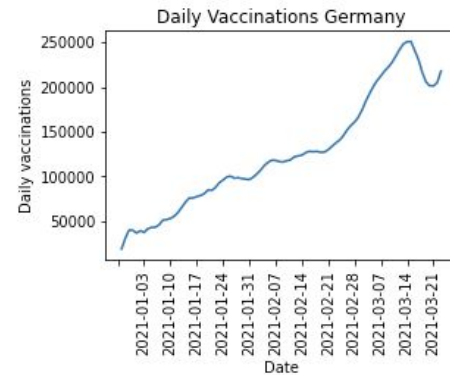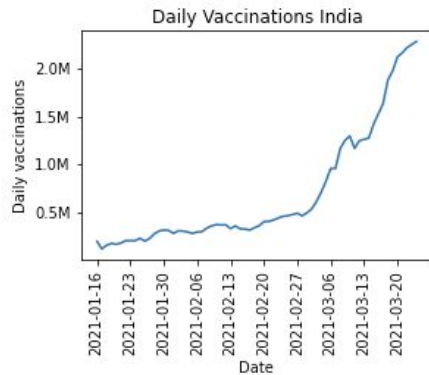
Vaccination progress by country and date

II. Vaccination Tweets Data Set

13-12-2020 to 24-03-2021

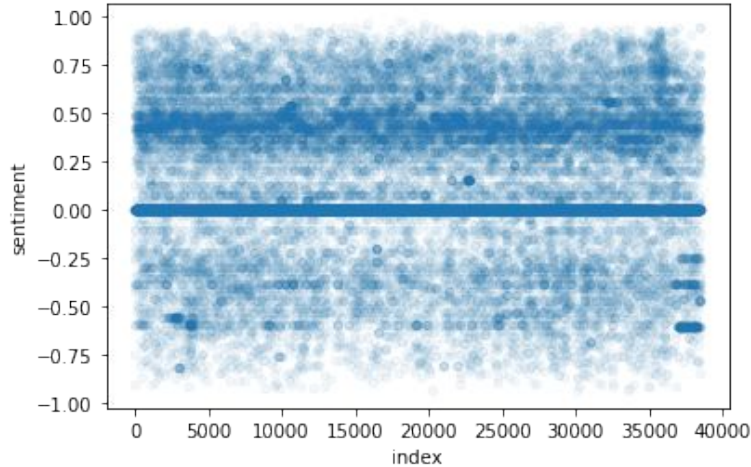**numbers**: general increase / daily changes

sentiments: pos. >> neg. (stable ratio, no shifts)

# Vaccination Tweets Data Set

- ca. 38.000 vaccination-related tweets

  - unlabeled, max. 140 characters, ca. 15% complete tweets

- Sentiment analysis tool VADER ('*Valence Aware Dictionary and Entailment Reasoner*')

  - validation via a hand-labeled test-set of full tweets (1000 out of ca. 5600 tweets)

All tweets vs. full tweets (VADER)

all tweets

neutral   0.440031
positive   0.369507
negative   0.138410
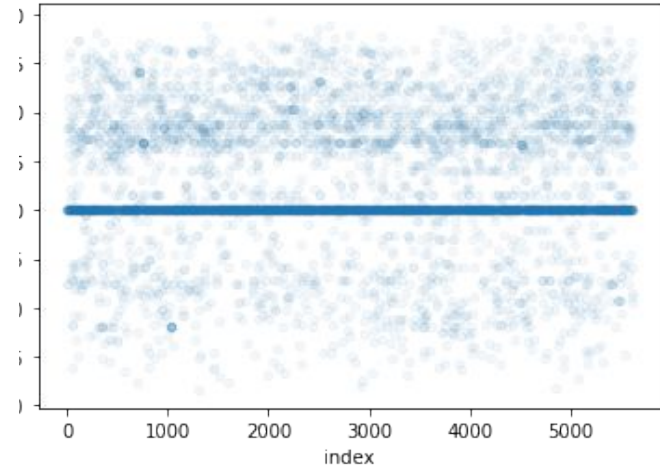
full tweets

neutral   0.492083
positive   0.389148
negative   0.170820

Explananda

- Numbers
    - increase
    - daily changes
- Sentiments
    - pos. >> neg.

1. Increasing numbers via vaccination progress

word frequency in 'text'

	words_text_freq	count
0	vaccine	8513
1	#moderna	6181
2	first	4147
3	#covaxin	4115
4	#covid19	4070
5	#pfizerbiontech	3492
6	dose	3169
7	#vaccine	3064
8	#sputnikv	2855
9	covid-19	2052
10	#oxfordastrazeneca	1788
11	&	1780
12	get	1760
13	vaccines	1690
14	#covidvaccine	1599

Topics:

- (self-)reports on vaccinations
- plan to get vaccinated soon

additionally supported by

- topic modeling (pos./neg.)
- tweet-labeling by hand

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Steady increase

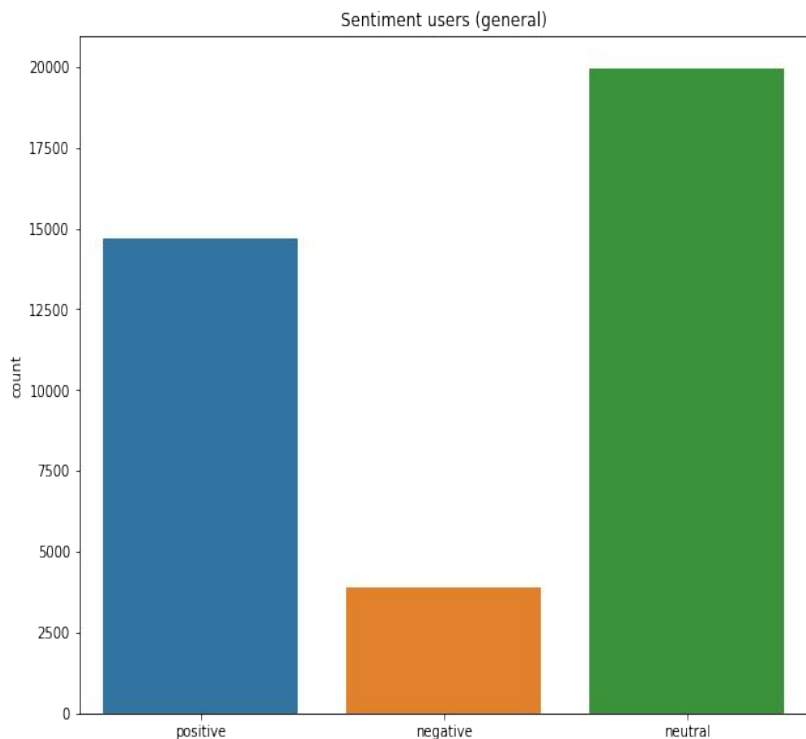actual vaccination progress

> more vaccinations to report

> more vaccination-tweets

Hypothesis

tweets numbers generally increase mainly due to vaccination progress

2. Sentiment via vaccination progress

pos. >> neg.

Sentiment users (general)

Vaccination reports

- vaccination report
    - acceptable side-effects ("worth it")
    - severe side-effects rare
- plan to get vaccinated
    - reflects positive attitude
    - no side-effects to report
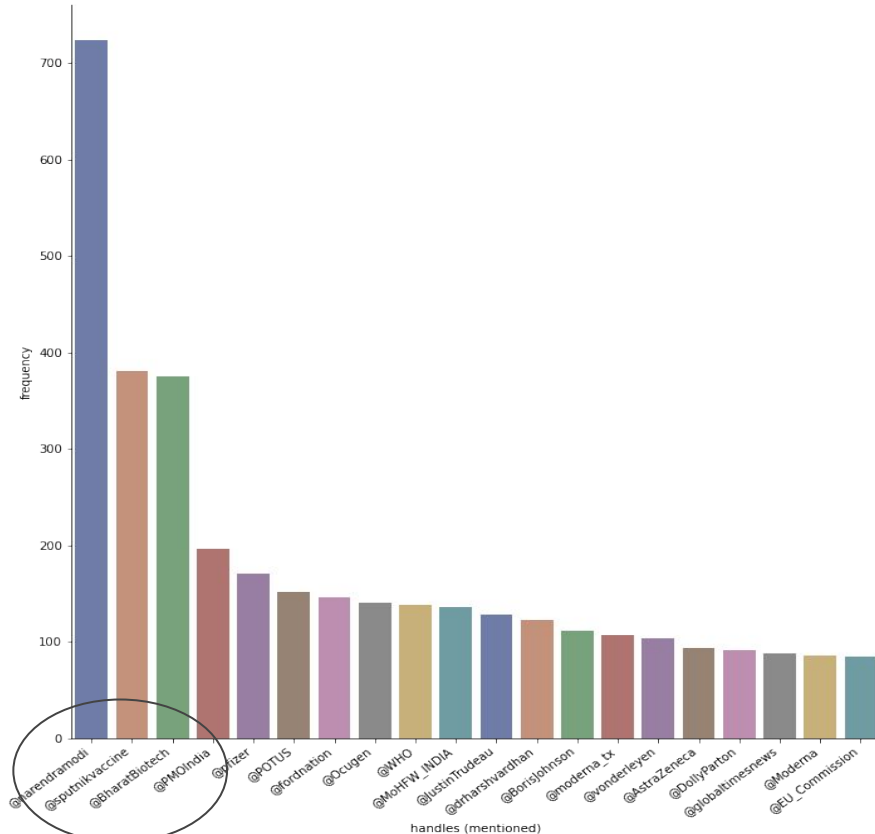
Hypothesis (beyond scope)

as "micro-news" vaccination tweets may have an effect on vaccination acceptance

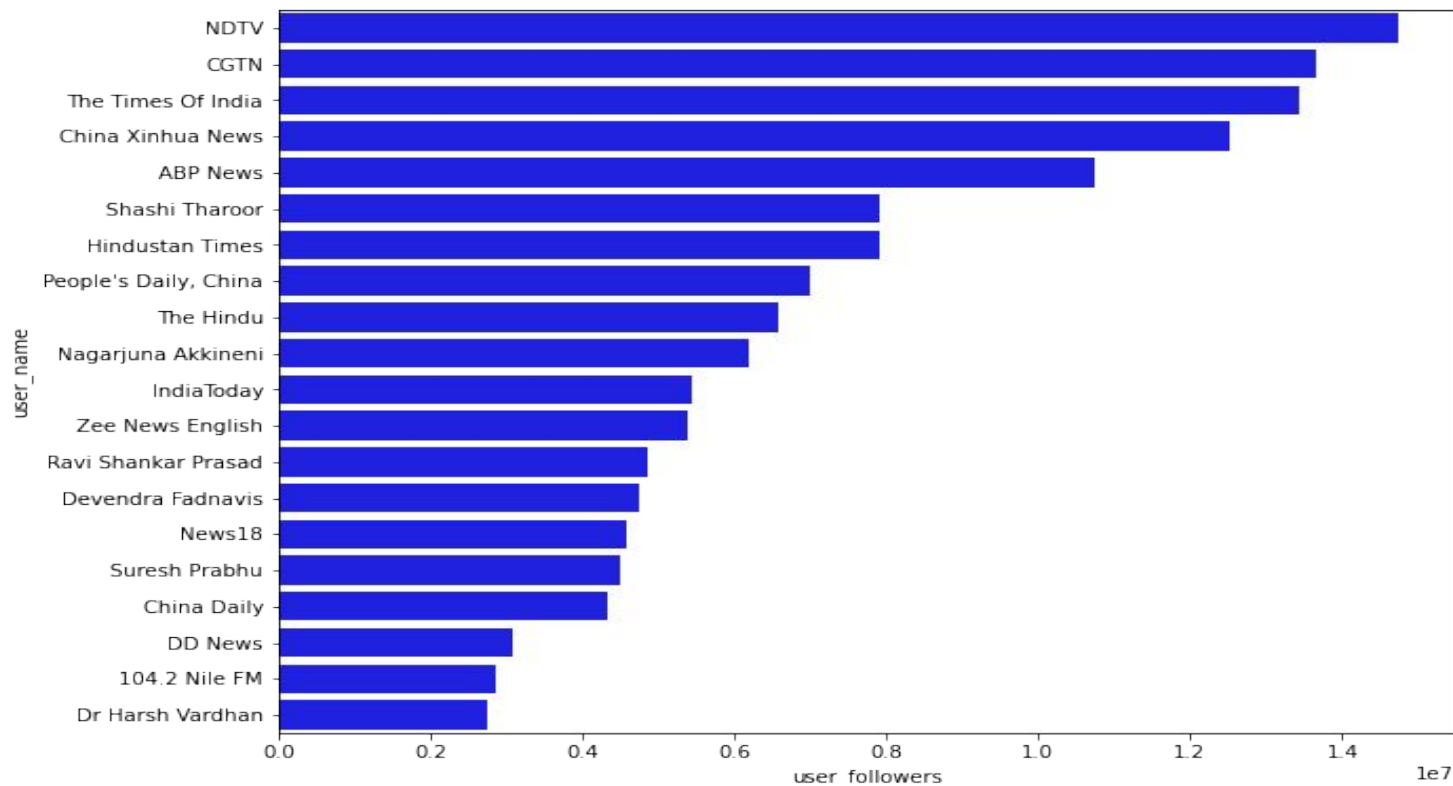# 3. Influence:

numbers / daily changes   **pos./neg.-ratio**

@ mentioned in tweets

global data only with restrictions
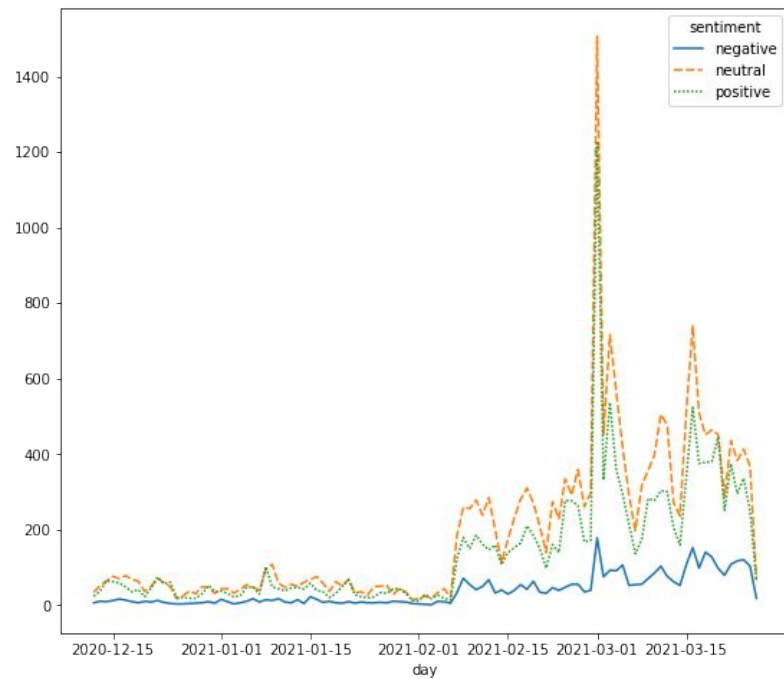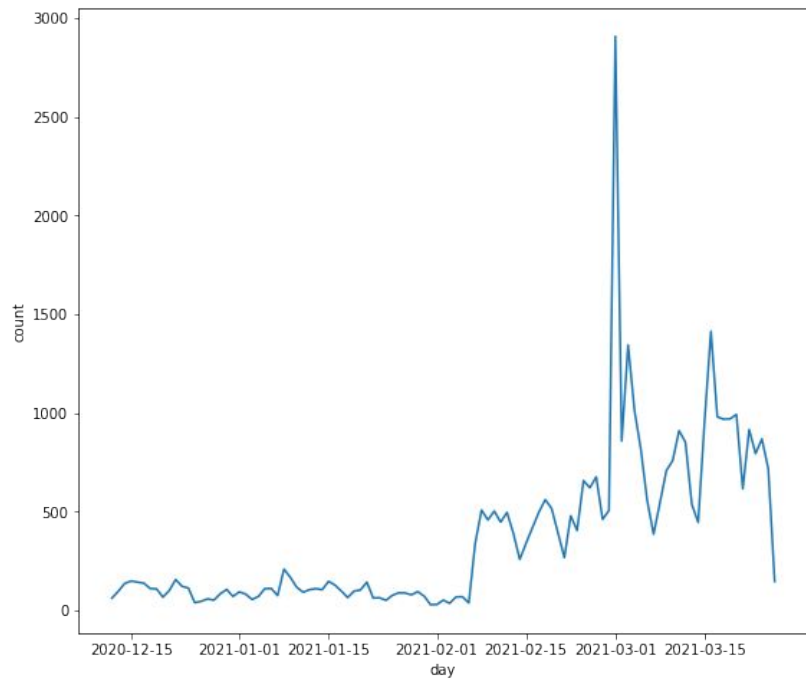
- dominant: India, … China

confirmed via:
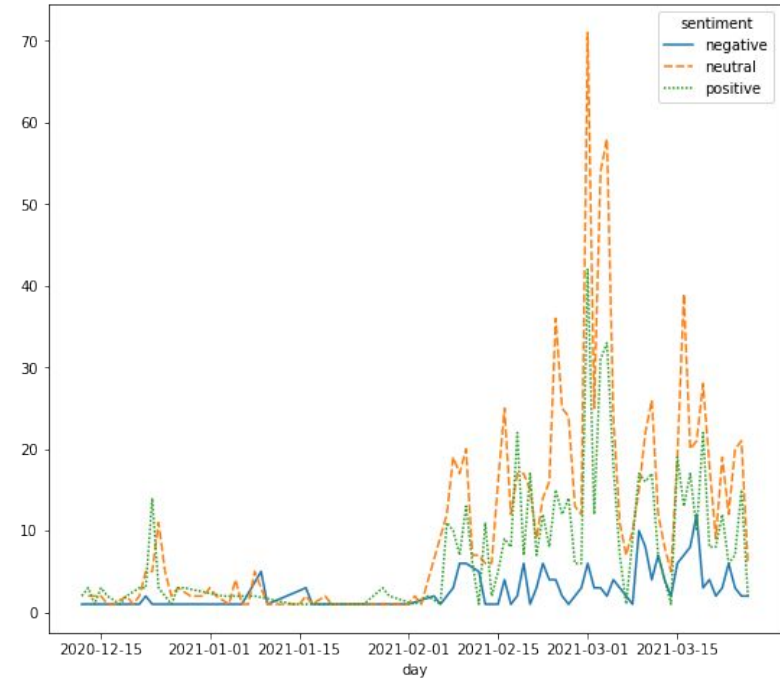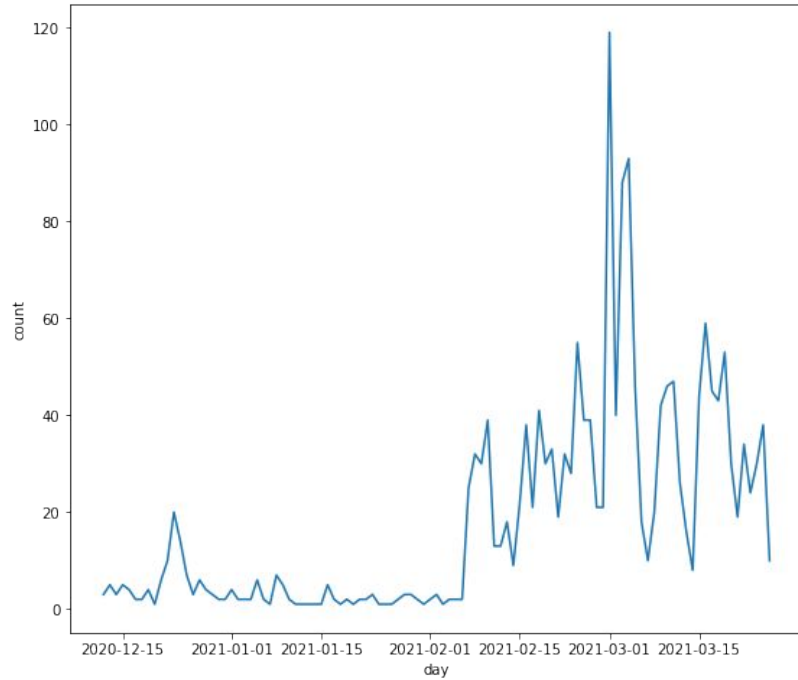
- location information
- most followers
- most retweeted

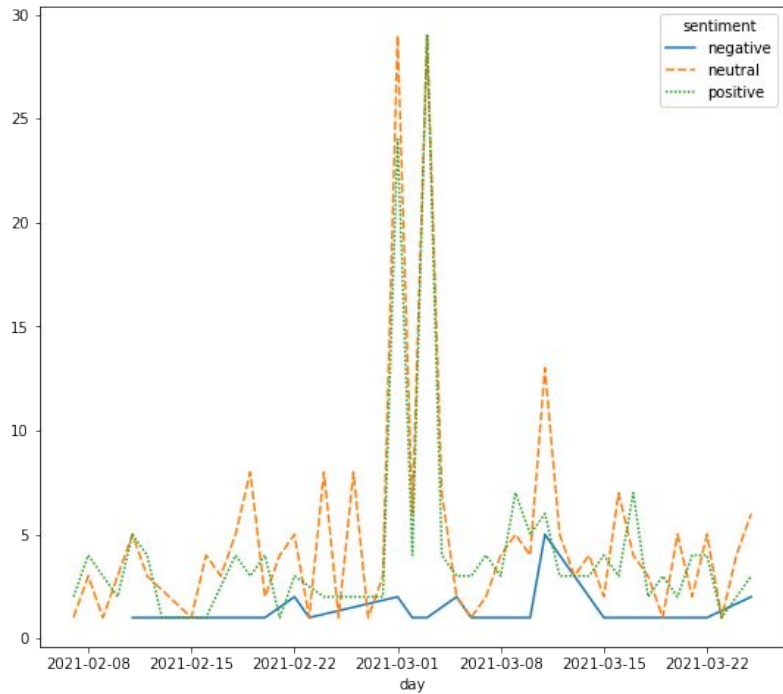User influence ranking: media from India (and China) dominate
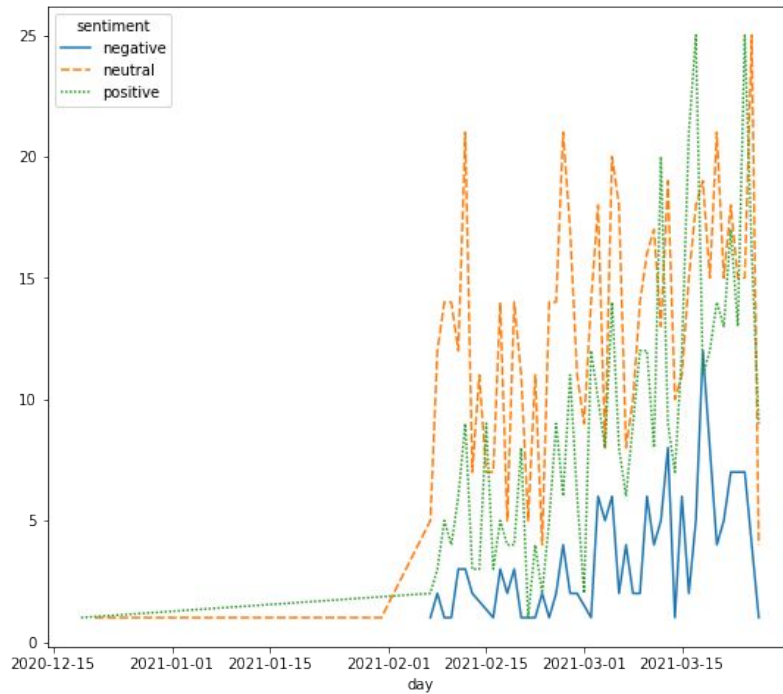
3.1 Numbers, daily changes

general (daily numbers, sentiments)

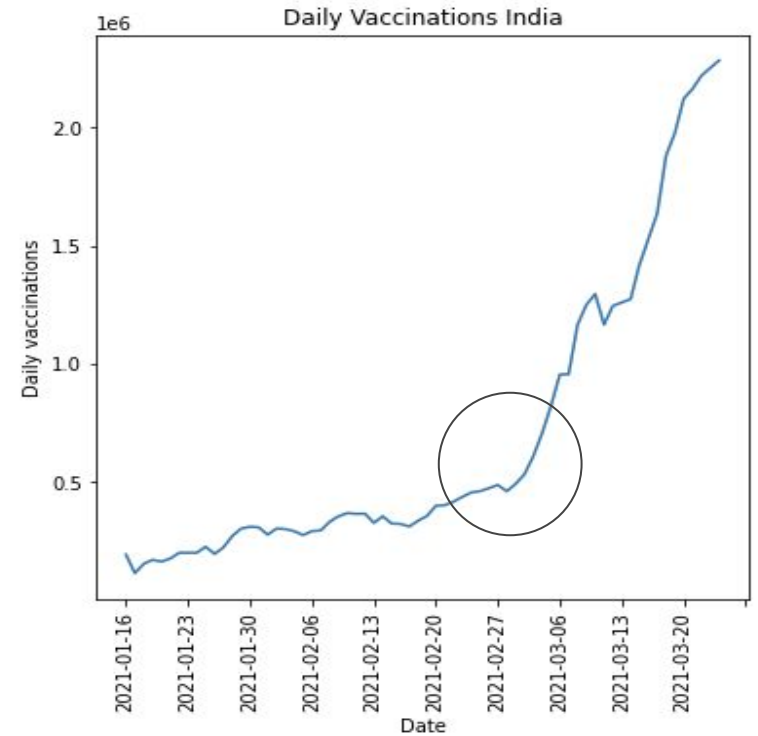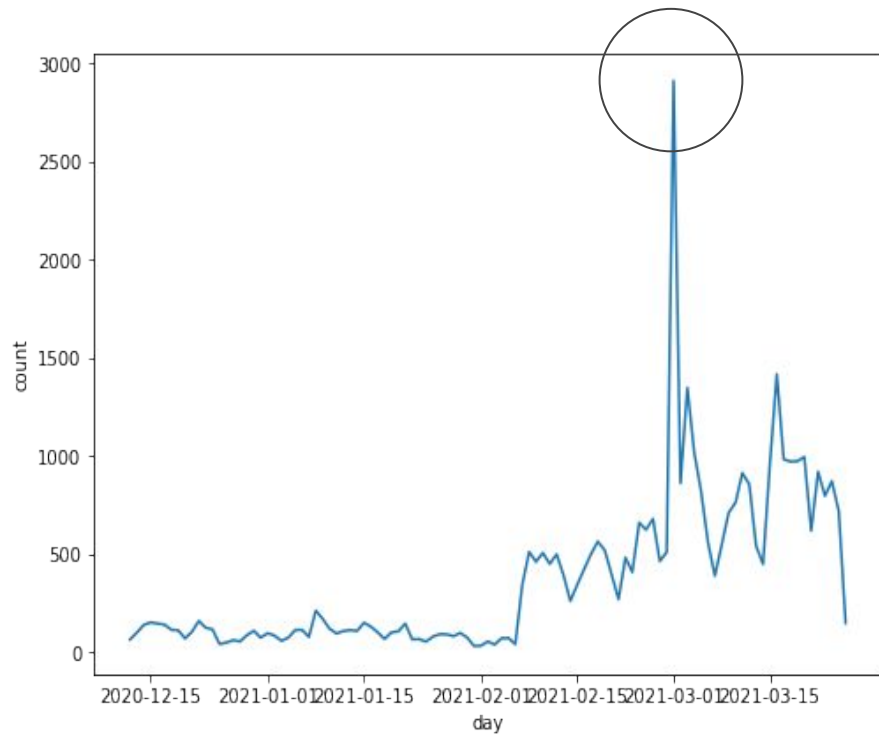**1%** (daily numbers, sentiments)
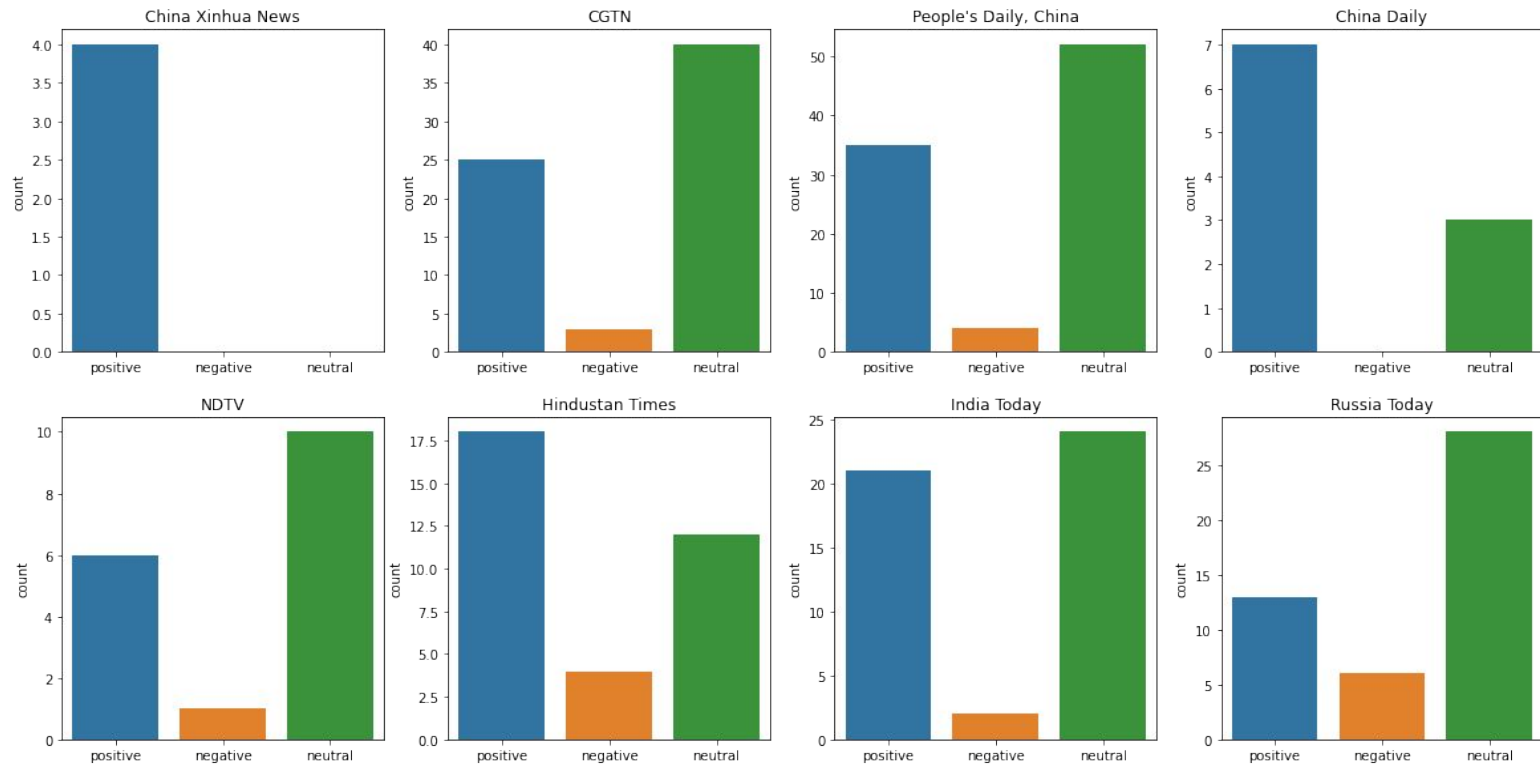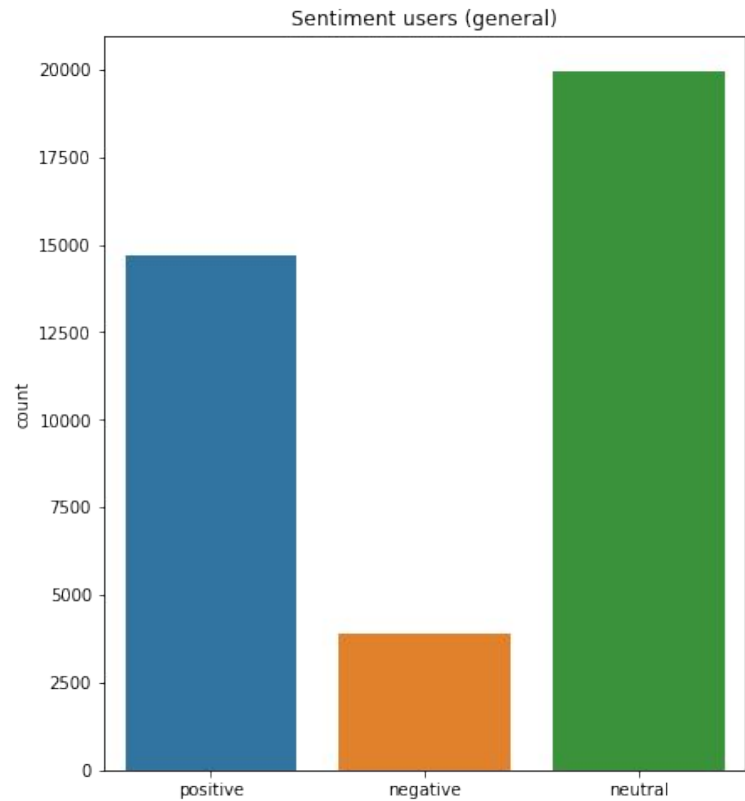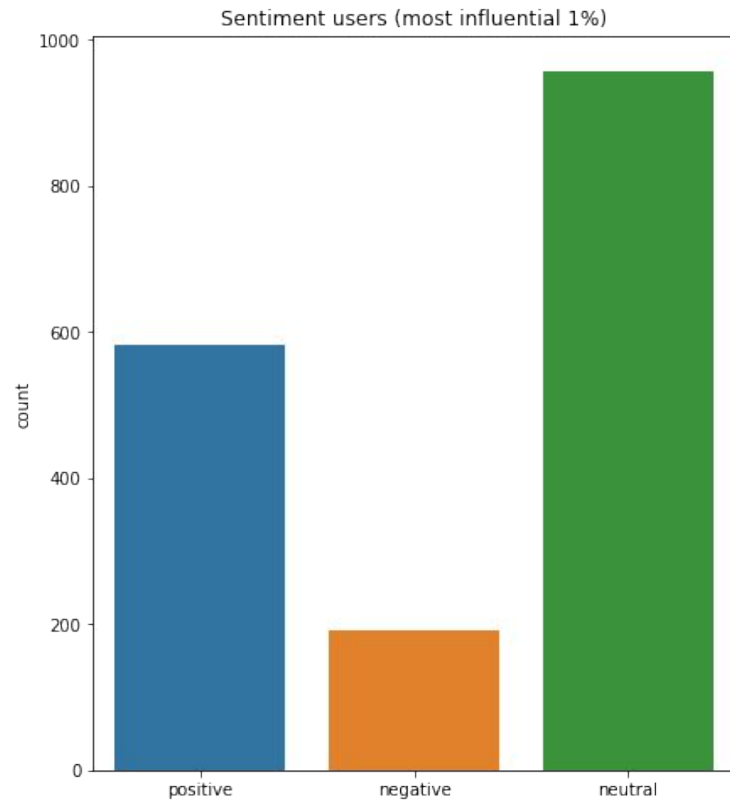
Covaxin

Moderna

News source influence: Narendra Modi (PM India) publicly vaccinated, *Covaxin* approved

Vaccination progress: India

3.2 Sentiments

positive media bias

Sentiment users (most influential 1%) — Sentiment users (general)

neutr. (most influential 1%) > neutr. (general)

III. Conclusions

Conclusions

VACCINATION PROGRESS

- vaccination start differs strongly between countries/regions
- vaccination strategies differ
- vaccine availability: rich countries have the advantage

TWEETS

- **vaccination progress**
  - strongly correlated to increase in tweet numbers (for India/China)
  - leads to more vaccination tweets
  - positive tweets dominate
- **influence hypothesis**
  - numbers and daily changes
  - pos. >> neg. (local effect)

Thank you for your attention!