Software Impacts 15 (2023) 100466

Contents lists available at ScienceDirect

Software Impacts

journal homepage: www.journals.elsevier.com/software-impacts

Original software publication

hiscovid for visualizing and identifying when policymakers made mistakes against COVID-19

Yoshiyasu Takefuji

Musashino University, Japan

ARTICLE INFO

Keywords:
COVID-19 policy
Scoring COVID-19 policies
COVID-19 deaths
PyPI packaging

ABSTRACT

There are two types of policy outcome analysis tools: snapshot tool and time-series tool. hiscovid is a time-series policy outcome scoring tool of COVID-19 policies by country where the daily cumulative population mortality is used for scoring the outcomes of COVID-19 country policies to visualize and identify when policymakers made mistakes. hiscovid allows policymakers to observe the progress and transition of scores over time to learn lessons from the past decision-making mistakes for correcting the current policies to reduce unnecessary deaths. The lower the score, the better the policy. hiscovid attracted 1480 users worldwide.

Code metadata

Current code version	*0.0.1*
Permanent link to code/repository used for this code version	https://github.com/SoftwareImpacts/SIMPAC-2022-304
Permanent link to reproducible capsule	https://codeocean.com/capsule/5655627/tree/v1
Legal code license	*MIT License*
Code versioning system used	*PyPI*
Software code languages, tools and services used	*python*
Compilation requirements, operating environments and dependencies	apt-get: wget, pip3: matplotlib, pandas, numpy, hiscovid
If available, link to developer documentation/manual	https://pypi.org/project/hiscovid/
Support email for questions	takefuji@keio.jp

1. Motivation and significance

There is no open-source time-series outcome policy analysis tool against the COVID-19 pandemic to visualize and identify when policymakers made decision-making mistakes. For this purpose, hiscovid was created.

- *There are two types of policy outcome analysis tools: a snapshot list of sorted scores and time-series scores. The hiscovid tool is the world's first time-series policy outcome analysis tool.*
- *The daily cumulative population mortality is used for evaluating country time-series scores: dividing the number of daily cumulative deaths by the population in millions.*
- *hiscovid is a time-series policy outcome analysis tool intended for policymakers to learn the past mistakes over time. hiscovid allows policymakers to observe the progress and transition of scores over time for correcting the past decision-making mistakes to reduce unnecessary deaths in the future.*
- *The hiscovid tool is a PyPI application so that it can be installed by the pip command. PyPI allows hiscovid to run on Windows, MacOS, and Linux operating systems as long as Python is installed on the system.*

2. Limitations

- The snapshot policy outcome analysis tools such as scorecovid cannot visualize and observe the progress and transition of scores while time-series policy outcome analysis tools such as hiscovid allow us to visualize and observe the behavior of the transition and to identify when policymakers made mistakes over time. The hiscovid tool is a PyPI application so that as long as Python is installed on the system, it can run on Windows, MacOS, and Linux operating systems. However, the hiscovid tool cannot discover the best COVID-19 policy in the world.

The code (and data) in this article has been certified as Reproducible by Code Ocean: (https://codeocean.com/capsule/5655627/tree). More information on the Reproducibility Badge Initiative is available at https://www.elsevier.com/physical-sciences-and-engineering/computer-science/journals.

E-mail address: takefuji@keio.jp.

https://doi.org/10.1016/j.simpa.2023.100466
Received 17 December 2022; Received in revised form 6 January 2023; Accepted 8 January 2023

3. Software description

Software is composed of setup.py, hiscovid.py, and README.md.

3.1. Software architecture:

The directory and software structure is as follows:

```
├── README.md
├── setup.py
├── src
   ├── hiscovid.py
```

3.2. Software functionalities:

The latest data on COVID-19 deaths by country is scraped over the Internet from: https://covid.ourworldindata.org/data/owid-covid-data.csv.

Using pandas. DataFrame, scraped cumulative deaths and population are used for calculating scores. The result is stored in result.png file. The individual country csv files are also generated by the country names.

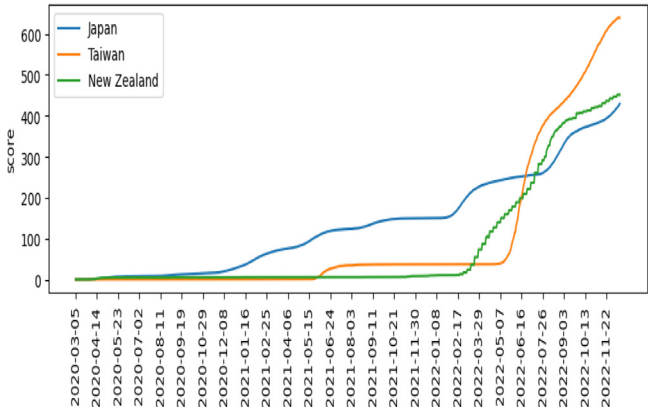
4. Illustrative examples

To run scorecovid, install it and type the following command:

$ pip install hiscovid

$ hiscovid Japan Taiwan 'New Zealand'

Four files such as result.png, Japan.csv, Taiwan.csv and New Zealand.csv will be generated.



The result.png of hiscovid with Japan, Taiwan and New Zealand as of Dec. 16, 2022

The generated result.png shows that New Zealand made a single mistake in March 2022 and Taiwan made two mistakes: the first one in May 2021 and the second one in May 2022. Japan made multiple mistakes. The lower the score, the better the policy.

The graph for New Zealand shows that the mandatory test-isolation policy until March 2022 was quite effective against COVID-19. The flat line indicates successful pandemic suppression of COVID-19. The test-isolation policy is to test and identify infected individuals at an early stage and isolate them from uninfected people during the quarantine period. The longer the quarantine period, the less COVID-19 spreads. The shorter the quarantine period, the more COVID-19 spreads. New Zealand should not have changed its effective policy. Similarly, Taiwan should not have changed the mandatory test-isolation policy until May 2022. The graph of Japan did not contain the flat line which means their policy was not successfully suppressing the COVID-19 pandemic like New Zealand and Taiwan. To our knowledge, there is no good indicator such as the cumulative daily population mortality rate to measure policy outcomes.

5. Impact

The hiscovid tool allows us to observe the progress and transition of scores over time for identifying when policymakers made mistakes against COVID-19. However, the time-series policy outcome analysis tools cannot reveal the best policy among countries in the world. hiscovid attracted 1542 users worldwide.

hiscovid is with MIT license. The software can be freely used. The method of hiscovid was peer-reviewed by five journals [1–5]. The software reproducibility is validated via Code Ocean.

The proposed method is based on the single metric of the daily cumulative population mortality. The proposed software can be applied to other disease outbreaks to observe the policy results over time and identify progress and trends to modify the current policy. In other words, as long as the dataset is ready to be used for time-series policy analysis, the proposed hiscovid has the high transferability and is usable and applicable in the future.

6. Conclusions

In order to mitigate the COVID-19 pandemic, it is wise for policymakers to learn their past mistakes over time for correcting the current policies to reduce unnecessary deaths in the future. hiscovid can visualize and identify when policymakers made mistakes against COVID-19.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Y. Takefuji, How to build disaster-resilient cities and societies for making people happy, Build. Environ. 228 (2023) 109845, http://dx.doi.org/10.1016/j.buildenv.2022.109845.

[2] Y. Takefuji, Policy analysis and data mining tools for controlling COVID-19 policies, Network Model. Anal. Health Inform. Bioinform. 12 (1) (2023) 4, http://dx.doi.org/10.1007/s13721-022-00400-3.

[3] Y. Takefuji, COVID-19 policy analysis for 10 European countries, J. Public Health (2022) 1–8, http://dx.doi.org/10.1007/s10389-022-01786-0, Advance online publication.

[4] Y. Takefuji, Time-Series COVID-19 Policymaker Analysis of the UAE, Taiwan, New Zealand, Japan and Hungary, Dialogues in Health, 2022, http://dx.doi.org/10.1016/j.dialog.2022.100081.

[5] Y. Takefuji, Sustainable policy: Don't get infected and don't infect others, J. Hazard. Mater. Adv. 8 (2022) 100165, http://dx.doi.org/10.1016/j.hazadv.2022.100165.