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MOBILE APPS: A COMBATANT IN SUSTAINING THE BATTLE AGAINST COVID-19 IN INDIA - A REPORT AND REVIEW

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Abstract

The contagious coronavirus, or a lot of technically called COVID-19, has unfold everywhere the world and is listed as a virus by the World Health Organization [1]. It started emergence in China in November 2019 and has been on the increase all told major components of the World. On thirtieth January 2020, the primary case of coronavirus pandemic in India was reportable, and therefore the range of cases in India has currently reached over 1.48M [3]. If someone is tested positive for coronavirus, everyone has been available in contact with the infected individual is suggested to have for self-quarantine for 2 weeks, so the infection chain will be broken and therefore the condition does not unfold additional. At the earlier stage, there was no specific treatment or immunizing agent on the market for COVID-19. Hence, several countries were attempting to develop contact-tracing techniques through that they will trace the person suspected of the infection.

Amongst the rapidly evolving COVID-19 setting, mHealth apps unit of measurement collaborating throughout an important role in mitigating the COVID-19 response, however to

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that current purpose, there has not been any define and comparisons of the mHealth apps that unit of measurement developed to combat this pandemic. The aim of this review is to scope the proof base for articles that drawn apps that were developed in response to the COVID-19 pandemic. This paper categorizes and compares the offered apps by providing an outline of those apps, their functions, and to boot the alternatives used. A recommendation of helpful decisions is as well provided for developers and interested stakeholders. The App uses Bluetooth and GPS technologies to alert a user after they unit of measuring shut a COVID-19 infected person. The appliance uses varied informatics concepts like Classification, Association Rule Mining, and bunch to investigate COVID-19 unfold in land. The study along shows potential upgradations within the appliance, that has usage of computing and notebook computer Vision to hunt out COVID-19 patients.

1. Introduction

The world's battle against the Novel Coronavirus pandemic has seen vital reliance on technology. From governments, tending organizations, non-profits to non-public enterprises, nearly most area unit practice technology in some kind or the other to beat this "unknown enemy". India, the second most haunted country inside the planet, is not any exception-every central and state governments, beside personal players, have designed several mobile apps to retort to the pandemic, limit cases and assist people with managing health, a day wants and different essential needs.

In India, a mix of tried and new ways was set in motion to tackle the COVID-19 happening. Driven by political commitment and seamless coordination amongst officers and partners, the govt. used measures beside early screenings, argus-eyed police investigation, tracing, testing and analytic, digital interventions and strengthening the tending system. It completes the happening management by establishing district-level management rooms for observance the on-ground situation, mobilization frontline doctors with the tools they needed, whereas collaborating with communities, addressing people's psychosocial needs and guaranteeing the delivery of essential health services throughout this crisis. This paper format is the division of Introduction, Significance of Data, Mobile Apps for Covid protection, Methodology, Mobile Application of Indian Government, Apps of Different States, Limitations and Future work, Results and Conclusion.

2. Significance of Data

The importance of credible data that may be provided in associate degree passing timely manner to the public has half been self-addressed by variety of

the data providing apps developed for COVID-19. The data providing apps illuminate with reference to the coronavirus, disease, wise hygiene practices, and tips that would follow, like social distancing and jointly the importance of carrying face masks [5-8]. However, throughout the initial stages of the pandemic, the mHealth markets saw the emergence of developer's social unit were making a shot to wish advantage of matters by making fake apps [9], but as ransomware apps that mandated users to transfer cash and vulnerable deletion of the phone's storage if cash was not transferred [10]. There are additionally giant amounts of data on infobahn [11]. In response, the executive unit worked with Google but as a la mode social media sites like Facebook, Twitter, Tencent, and TikTok to combat this data [12]. What is further, steps were taken by social media apps like Facebook, YouTube, Twitter, Instagram and Snapchat to limit the fast unfold of data to their big audience reach [13]. WhatsApp, a popular communication app, additionally restricted the quantity of times users might forward messages associated with COVID-19 to cut back the unfold of data with reference to the coronavirus [14]. Amid the quickly evolving COVID-19 atmosphere, mHealth apps area unit collaborating in associate degree passing vital role in mitigating the COVID-19 response, however to the present purpose, there has not been any outline and comparisons of the mHealth apps that area unit developed to combat this pandemic. This paper categorizes and compares the offered apps by providing an overview of those apps, their functions, and jointly the alternatives utilized. A recommendation of helpful selections is additionally provided for developers and interested stakeholders.

3. Mobile Apps in Covid Protection

"Prevention is better than cure", as this word we should prevent ourselves first before getting affected. Mobile apps are more helpful in this regard. The first COVID-19 apps that were developed and wide published were contact tracing apps that were created to send information to its users if they had crossed with another person infected with the coronavirus [7]. The primary national app was developed in Singapore that used Bluetooth technology for contact tracing [8]. If somebody were in nearby any infected individual, the app would send a push notification to alert them of potential COVID-19 infection and more counsel that they bear testing [9]. The technology was

created open supply and shared internationally for different countries to make similar apps for his or her own populations [10-12]. Since then, there are numerous different styles of contact tracing apps on the market, every victimization totally different strategies of information assortment to trace the movements of its users.

The second app developed was Symptom monitoring apps emerged in response to COVID-19. These apps commonly collect information about the user's health by posing a list of questions related to symptom identification, from which a differential diagnosis is made [13]. In those earlier days quite 2 months of Lock down period, the India has concave out a minimum of sixty-two apps that facilitate users with a spread of Covid necessities. Nearly all of those are launched by official bodies the central government, state governments, government-run health agencies, municipal authorities, and police, and are largely developed by little glorious personal IT companies. Here is a list of the top apps that are helping India tide over the COVID-19 crises.

4. Methodology

Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for scoping reviews, literature searches were conducted on Google Search, Google Scholar, and PubMed using the country's name as keywords and "coronavirus," "COVID-19," "nCOV19," "contact tracing," "information providing apps," "symptom tracking," "mobile apps," "mobile applications," "smartphone," "mobile phone," and "mHealth." Countries most affected by COVID-19 and those that first rolled out COVID-19-related apps were included.

It was found that governments, together with the Union government and twenty-two State and Union Territories, endowed within the development of mobile apps to subsume this crisis. whereas there have been variations within the State-specific data within the apps developed by completely different States, the system design and plenty of the functionalities, together with self-testing, quarantine observance and call tracing, were common between these State-level apps. The Ministry of physical science and knowledge Technology, Government of Republic of India, has taken proactive

measures to push the installation and usage of the Aarogya Setu app, that is presently accessible in eleven Indian languages [16].

5. Mobile Applications of Indian Government

Aarogya Setu app: Apart from warning users if they are available in proximity of somebody WHO has tested positive for COVID-19 and providing recommendations on preventive measures, the Aarogya Setu app, developed by the govt of India, connects folks with essential health services. The mobile app has to date been downloaded over ten million times and has been actively promoted by the Indian Government. Covid nineteen Feedback This app has been developed by the Indian Ministry of natural philosophy and knowledge Technology.

COVID-19 Feedback app: It has been designed to act sort of a survey tool to collect data from users concerning any treatment or tests they will have undergone within the recent past.

MyGov App: This Government of India app was designed to act as a subject engagement platform for direct subject participation in governance. Through the app, the voters may share their ideas, comments and inventive suggestions with the central ministries and associated organizations. within the wake of the COVID-19 irruption, the govt. has introduced a brand-new section on the MyGov app. The app additionally provides different relevant data and official advisories regarding the Novel Coronavirus.

SAHYOG App: India's national mapping agency, Survey of India, has developed the SAHYOG app, which can complement Aarogya Setu to satisfy contact tracing, public awareness, and self-assessment objectives. The app collates information collected at the state level and geo-tags it so the mapping agency will analyze this data because the information grows.

Apps of Different States

COVID-19 Quarantine Monitor. Tamil Nadu state: The state authorities, in partnership with a non-public player, has developed the COVID-19 Quarantine Monitor to confirm that voters underneath home

quarantine doesn't violate official pointers. An individual must have a Tamil Nadu-registered mobile range to use this app.

COVA Punjab. The govt. of Punjab designed and developed an app for preventive care of the public with the name called as Corona Virus Alert App (COVA).

Test Yourself Goa. The check Yourself Goa app is developed by Goa Ministry of Health unitedly with Innovaccer. The app is presently offered on Google Play, however Apple customers need to wait. This app provides the users to self-diagnose COVID-19 symptoms when downloading the app. For data on essential services, you may would like the COVA Punjab app in Punjab, whereas those in Haryana have to be compelled to transfer January Sahayak – Help Me App.

In India within 2 months period there were nearly a minimum of sixty-two apps that facilitate users with a variety of Covid needs. Nearly all of those are launched by official bodies – the central government, state governments, government-run health agencies, municipal authorities, and police, and are largely developed by very little noted personal IT companies.

Figure 1. Apps used in Different States.

The following Table shows Mobile apps used in different states of India.

NO	State Name	Mobile App Name
1	RAJASTHAN	RajCovidInfo
2	KARNATAKA	Quarantine Watch, Corona Watch

3	GOA	Test Yourself
4	PUDDUCHERRY	Test Yourself
5	TAMIL NADU	COVID-19 Quarantine Monitor
6	PUNJAB	Cova Punjab, Help me App
7	CHATTISGARH	CG COVID-19, ePass
8	UTTAR PRADESH	Ayush Kavach
9	WEST BENGAL	COVID-19 West Bengal
10	HIMACHAL PRADESH	Corona Mukt Himachal
11	CHATTISGARH	Kavach
12	MAHARASHTRA	Maha kavach
13	MADHYA PRADESH	MP Covid Response
14	HARYANA	Haryana Sahayak
15	Odisha	COVID-19 Odissa
16	Arunachal Pradesh	Covid care
17	Kerala	GoK direct Kerala

These COVID-19 apps and maps these World Health Organization guidelines and recommendations on digital health interventions for health systems strengthening. The most category of apps performs dissemination of COVID-related data on preventative methods like as twenty-seven (43%) apps. Nineteen (30%) apps were developed to watch the movements of unintegrated people. On-demand data services through chatbots or telecom helplines were offered solely in nineteen (30%) apps. Fifteen apps (24%) provided users with a self-risk assessment perform supported a collection of screening queries associated with their symptoms, occupations, travel history, and get in touch with history. data on the provision of COVID-19 testing facilities was offered in six (09%) apps. Four (6%) apps had a provision for booking teleconsultation or testing appointments. the provision of Associate in Nursing electronic pass for movement throughout the internment was the sole health workforce-specific perform offered in four (8%) apps. In terms of the information for health managers and policy selections, 9 (18%) apps give aggregation and image of the State

governments' knowledge associated with confirmed cases and deaths. Eight (16%) apps had a contact tracing and hotspot identification perform.

6. Limitations and Future Work

Since COVID-19 could be a new happening and therefore the scenario is quickly evolving, the articles during this review were principally from news articles and on-line webpages. There have been few peer-reviewed journal articles regarding mobile apps associated with COVID-19. Furthermore, we tend to could not conduct a radical search of the Google and Apple apps stores for other countries as most of the apps were country-specific; therefore, they might not be downloaded and evaluated. Hence, we tend to might solely acquire data from the news articles and webpages that were found, however the main points on the various apps were additionally not comprehensive in these articles. In addition, the databases searched (Google computer programme, Google Scholar, Scopus, and PubMed) may not are able to give data on sure apps because of country restrictions, for instance, apps from China. Another limitation was that sources in languages apart from English were additionally not included during this review. From these sources, we tend to might only collate apps that were either already accessible to the overall public or still underneath development throughout the amount of review. We advocate that a lot of comprehensive review ought to be done in the close to future once true is stable, possibly post-COVID-19. Future work on however effective these apps were in decreasing the coronavirus unfold ought to even be undertaken. This will facilitate establish apps and options that are helpful in future pandemics.

7. Results

Of all the apps evaluated $(N = 62)$, the Arogya setu app is well used for contact tracing alone, the other seven (3%) app with every contact tracing and quarantine choices, and 6 (21%) apps strictly for imposing quarantine $(n = 15$ for contact tracing, $n = 7$ for quarantine). Similarly, there are 5 (17%) apps on symptom observation alone, one (3%) app having every symptom observation and data provision choices, one (3%) app with symptom watching feature and for analysis functions and one (3%) app was solely for analysis

functions (Table 1). There are twenty (69%) apps free from governments, 3 (10%) from personal organizations, and 3 (10%) from universities. There are 3 (10%) apps that did not provide data relating to their source; four (14%) were web-based, 6 (21%) were getable on alone humanoid or iOS, and 10 (34%) were getable on every platforms. There have been twelve apps (41%) that did not provide data on their platform convenience. In terms of the technology used, ten (34%) apps used Bluetooth for assortment data, twelve (41%) apps used GPS, and twelve (41%) used various forms of data assortment like manual input of details and questionnaires.

The penetration of the app is vital to the success of the technology-enabled contact tracing. Proof suggests that seventy per cent of the population ought to have the app put in for the digital contact tracing efforts to be effective. The present technological plurality within the absence of sturdy information exchange mechanisms and Centre-State coordination will be prejudicial for technology-assisted contact tracing in a very heterogeneous country like Republic of India, particularly once the internment ends and free movement of individuals starts. Overcoming this challenge needs the State and therefore the Union Government to make sure the mass installation of one contact tracing app collaboratively. In distinction, the State-specific apps would still be a significant medium of providing context-specific data and supporting native health systems.

8. Conclusions

This review has known a spread of apps that will be potentially helpful to curb the unfold of COVID-19. The bulk of the apps were for the needs of contact tracing and symptom observance. However, these apps, particularly those for contact tracing, will solely be effective if they are advocated by the govt. and brought up by the community. Contact tracing at an early stage, alongside correct hygiene, and social distancing practices, stay the perfect thanks to trot out COVID-19. Governments also can profit by encouraging their citizens to participate in their efforts to combat the pandemic, as within the case of Taiwan. Additionally, the sharing of fine practices across totally different countries, like the case of Singapore, will modify governments to be told from one another thus that effective ways to combat and manage this pandemic can be developed to regulate the unfold of the coronavirus.

This review has identified a variety of apps that may be potentially useful to curb the spread of COVID-19. Many of the apps were for the purposes of contact tracing and symptom monitoring. However, these apps, especially those for contact tracing, can only be effective if they are advocated by the government and taken up by the community. Governments can also benefit by encouraging their citizens to participate in their efforts to combat the pandemic, as in the case of all over the world. In addition, the sharing of good practices across different states and countries, such as the case of Singapore, can enable governments to learn from each other so that effective strategies to combat and manage this pandemic can be developed to control the spread of the coronavirus. Due to the well-known factors of each state with its own protocol and information system, the authorities are using separate applications than a tailor-made application of one application for everyone.

References

[1] D. Cucinotta and M. Vanelli, WHO declares COVID-19 a pandemic. Acta Bio Med.: Aten. Parmen 91(1) (2020), 157-160.

[2] World Health Organization, Coronavirus disease 2019 (COVID-19): Situation report. Retrieved from https://www.worldometers.ihnfo/coronavirus.

[3] The Government of India, 2020, Live updates from Worldometer, Retrieved from https://www.worldometers.info/coronavirus/country/india/.

[4] H. Cho, D. Ippolito and Y. W. Yu, Contact tracing mobile apps for COVID-19: Privacy considerations and related trade-offs, Retrieved from arXiv preprint arXiv:2003.11511.

[5] M. Amit, H. Kimhi, T. Bader, J. Chen, E. Glassberg and A. Benov, Mass-surveillance technologies to fight coronavirus spread: the case of Israel, Nat. Med. (2020), 1-3.

[6] A. Hutchinson, WhatsApp launches World Health Organization chatbot to answer COVID-19 queries. Social Media Today, 2020 Mar. 21. URL: https://www.socialmediatoday.com/news/whatsapp-launches-world-health-organization-chatbot-to-answer-COVID-19-quer/574617/[accessed 2020-04-10].

[7] S. Basford, Here's how to access the government's coronavirus WhatsApp (and how to use it). Lifehacker Australia. 2020 Apr. 06. URL: https://www.lifehacker.com.au/2020/03/heres-how-to-access-the-governments-coronavirus-whatsapp-and-how-to-use-it/[accessed 2020-05-17]

[8] M. Singh, India launches WhatsApp chatbot to create awareness about coronavirus, asks social media services to curb spread of misinformation, TechCrunch. 2020 Mar. 21. URL: https://techcrunch.com/2020/03/21/india-whatsapp-mygov-corona-helpdesk-bot/ [accessed 2020-03-29]

[9] S. Warwick, UK government launches WhatsApp coronavirus information service,

Android Central, 2020 Mar. 27. URL: https://www.androidcentral.com/uk-government-launches-whatsapp-coronavirus-information-service[accessed 2020-03-30].

[10] J. Peters, Google has banned the Infowars Android app over false coronavirus claims, The Verge. 2020 Mar. 27. URL: https://www.theverge.com/2020/3/27/21197701/google-banned-infowars-android-app-play-store-coronavirus [accessed 2020-04-01].

[11] A. Villas-Boas, A fake coronavirus tracking app is actually ransomware that threatens to leak social media accounts and delete a phone's storage unless a victim pays $100 in bitcoin, Business Insider Australia, 2020 Mar. 17. URL: https://www.businessinsider.com.au/coronavirus-fake-app-ransomware-malware-bitcoin-android-demands-ransom-domaintools-2020-3?r=US&IR=T [accessed 2020-04-10].

[12] D. Child, Fighting fake news: the new front in the coronavirus battle, Al Jazeera, 2020 Apr. 13. URL: https://www.aljazeera.com/news/2020/04/fighting-fake-news-front-coronavirus-battle-200413164832300.html [accessed 2020-05-17].

[13] WHO launches campaign against misinformation on coronavirus, The Straits Times. 2020 Feb. 03. URL: https://www.straitstimes.com/world/europe/coronavirus-who-launches-campaign-against-misinformation [accessed 2020-02-15].

[14] How are digital platforms stopping misinformation on COVID-19 - public knowledge. Public Knowledge, URL: https://www.publicknowledge.org/tracking-report-covid19-misinformation/ [accessed 2020-04-28].

[15] K. Leswing, Apple is rejecting coronavirus apps that aren't from health organizations, app makers say, CNBC. 2020 Mar. 05. URL: https://www.cnbc.com/2020/03/05/apple-rejects-coronavirus-apps-that-arent-from-health-organizations.html [accessed 2020-04-10].

[16] WhatsApp to further limit forwarding of messages to one chat at a time to combat misinformation during COVID-19 outbreak, The Online Citizen. 2020 Apr. 07. URL: https://www.theonlinecitizen.com/2020/04/07/whatsapp-to-further-limit-forwarding-of-messages-to-one-chat-at-a-time-to-combat-misinformation-during-covid-19-outbreak/ [accessed 2020-04-10].

[17] https://play.google.com/store/apps/details?id=com.joinzoe.covid_zoe.

[18] https://www.geospatialworld.net/blogs/top-indian-apps-to-fight-covid-19 https://play.google.com/store/apps/details?id=in.gov.punjab.cova.