Mobile Apps and COVID-19

Public Sector:
How do States Worldwide Use Artificial Intelligence and Apps to Fight the Pandemic?

2nd Edition

Innovation and Artificial Intelligence
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Introduction[1]

In face of the advance of the COVID-19 pandemic, States have been forced to develop new strategies of which most involve taking advantage of the benefits of the Third and Fourth Industrial Revolutions. Thus, the development and launch of multiple technologies, platforms and/or apps with various functions and purposes is fully noted.

From the Innovation and Artificial Intelligence Laboratory of the School of the Law of the University of Buenos Aires, we continue to dedicate ourselves to the study, analysis and systematization of the main tools that have emerged in recent times to deal with COVID-19. In this opportunity, we decided to present the 31 main apps pertaining to the **public sector** which we have divided by continent for best exposure.

Focusing on the skills and functions that each app presents, we can classify them into:

1) Emerging Technologies for Contagion Prevention and Detection in Critical Areas

In this group are those apps whose main function is to focus isolation policies on those people who are infected or who are at risk -current and imminent- of contracting the disease. For this reason, they track the geolocation of users and, when they become infected or have symptoms compatible with COVID-19, they can meet others who have shared a place with the former and, therefore, are at risk of contagion. In addition to those that use geolocation, there are those that, through the use of *Bluetooth*, can know with whom one has been in contact and, thus, subject them to isolation if they have coincided with an infected person or with symptoms compatible with COVID-19.

Moreover, they allow us to know which are the areas that imply greater sources of contagion because there are considerable amounts of people suffering from the disease.

The benefit of this type of technology, whose number grows by the week, is that they allow for isolation policies to be effective and efficient since with them it is possible to verify,

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with a considerably high degree of precision, who may be at risk of suffering from the disease and therefore preventing the contagion from multiplying, while the rest of the population can relatively continue their life normally, according to the internal policies of each country.

2) Emerging Technologies for Diagnosis and Medical Care

This group includes those apps whose main function is that users can carry out self-diagnosis tests and answer their consults, either through conversational agents or medical personnel that is available remotely. In this manner, it is possible to decongest the telephone attention services lines and, at the same time, for the authorities to estimate the number of people possibly infected.

3) Technologies that Organize and Offer Immediate and Real Information to Citizens

This group includes those apps that offer real and useful information to citizens about the evolution of the pandemic in the world and within countries, as well as the recommendations and advice provided by specialists.

Their main advantage is that they allow for all information to be located in the same place. Also, when dealing with official information from the State, users have the security of its veracity.

Please note that some of the apps classified within one group may share the functions of the others as well.

America

1) Emerging Technologies for Contagion Prevention and Detection in Critical Areas

- **Canada COVID-19**[2]

Canada COVID-19 is designed for keeping the users informed about COVID-19 in Canada and determining what actions and following steps should be taken by the user. Recommendations are personalized and based on your personal risk factors, since it requests information about age, postal code and device location. The data provided is combined with

[2] *See* in Apple Store: https://apps.apple.com/ar/app/canada-covid-19/id1505010304
Thrive Health official website: https://www.thrive.health/

the data of all the users and will be used to inform the provincial response to COVID-19 and allow for the user to obtain alerts based on location.

Furthermore, users will receive timely updates with important news and alerts from Canada's Ministry of Health. Recommendations and content are automatically updated based on the latest guidelines related to COVID-19.

- **COVID-19 PY**[3]

It is a platform developed at a national level in Paraguay for the interaction between health authorities and the people who must be quarantined. Through the app, people can register, update personal data and respond to a medical report of their health status. With its use, it will be possible to geolocate patients who have symptoms compatible with COVID-19. People who must be in isolation and health personnel will receive an SMS to connect to this tool, either through the web or the app.

The application crosses data from the Migration, the National Police and Public Health databases of those who entered the country, as well as from the provisions for quarantine compliance, daily medical self-reports, symptom detection, among others.

- **COVID-19 Support**[4]

This app, developed by the Government of the British Columbia Providence (Canada), was designed so that users are able to stay informed about COVID-19 and get important news and alerts from the Ministry of Health, which are updated automatically. When the individual downloads the app, they are asked to provide their age, zip code, and grant access to the device's location. The data provided is combined with all of the individual's data and will be used to supply information and send location-based alerts so that personalized recommendations are provided and based on personal risk factors.

- **COVID-19 TAM**[5]

It is a technological tool of the Tamaulipas' State Government (Mexico) which through the Ministry of Health, aims to communicate the active cases of COVID-19 within

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[3] Paraguay Government official website: *"Exclusive App launch for quarantined patients and health personnel"* https://www.mspbs.gov.py/portal/20679/lanzan-app-exclusiva-para-pacientes-en-cuarentena-y-personal-de-blanco.html

[4] *See* in Apple Store: https://apps.apple.com/us/app/bc-covid-19-support/id1502907052
British Columbia official website: https://bc.thrive.health/

[5] *See* in Apple Store: https://apps.apple.com/ar/app/covid-19-tam/id1505380068
Tamaulipas Government official website: https://www.tamaulipas.gob.mx/

the State and also provides information on the total number of cases that are under investigation and those which were discarded. In this way, and through the app's use, it is possible to obtain the breakdown of total active (divided into asymptomatic, moderate and severe), recovered and fatal cases.

To track cases and prevent the virus from spreading, the tool accesses geolocation.

- **Plan Jalisco COVID-19**[6]

It is a technological tool, launched by the Secretary of Finance of the Government of the State of Jalisco (Mexico), which allows verifying if the users have had contact with people who suffer from COVID-19 and/or have been exposed to conditions and/or places that could represent a "close contact" with the virus.

The application also allows the authorities, to access the geolocation of their users, whenever they activate this functionality, with the aim of establishing the proper contact and monitoring of the cases of those suspected and/or infected individuals and achieving a more agile and effective response in each particular case.

"Plan Jalisco Covid-19" also provides its users with information on the symptoms and/or prevention of the COVID-19 virus in order to help prevent its spread, and to detect if they are being affected by the disease and obtain recommendations.

- **Gobierno de Nuevo León**[7]

It is an application developed in Mexico that includes official information about COVID-19. It allows you to find bulletins and communications, receive alerts and daily updates of cases and their geolocation.

It also offers a self-test questionnaire, which can also be done on the website.

- **COVID-19 MX**[8]

It is a self-diagnosis application, developed in Mexico at the national level, that works through a questionnaire and allows the user to obtain recommendations based on such. It uses geolocation in order to present the user with the health centers closest to where they

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[6] *See* in Apple Store: https://apps.apple.com/ar/app/plan-jalisco-covid-19/id1504356187
Jalisco official website, State Government: https://sepaf.jalisco.gob.mx/

[7] Mexico. Official website of Nueva León Government: http://www.nl.gob.mx/descarga-la-app-del-gobierno-de-nl-sobre-covid-19

[8] *See* in Apple Store: https://apps.apple.com/mx/app/covid-19mx/id1505632889

are located. In addition, it offers information, press conferences and statements from the Ministry of Health.

2) Emerging Technologies for Diagnosis and Medical Care

- **COVID-19 Ministerio de Salud**[9]

It is an app developed by the national Government of Argentina that allows for self-evaluations of COVID-19 symptoms to determine the possibilities of having contracted the disease. Through it, the data is collected and the information is processed, including that related to your health.

- **Autotest App BA**[10]

Autotest BA is an App developed by the Government of the Province of Buenos Aires, aimed at helping the user take the appropriate action in case of symptoms of COVID-19. First, the citizen completes a questionnaire and according to its answers, the application indicates whether the user is likely infected or not and the measures to be taken. The data entered it is stored and verified.

- **SaludEC**[11]

It is a medical management app developed by the national Government of Ecuador that includes communication services, patient registration and self-testing. In turn, it offers telemedicine and information services.

- **COVID Puebla**[12]

It is a local initiative app of the Government of Puebla (Mexico) that allows people to carry out self-evaluations to determine if they are at risk of having contracted COVID-19. They can also be done on the web, through the app or through *WhatsApp*. Within the portal,

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[9] Argentina. Ministry of Health official website: https://www.argentina.gob.ar/coronavirus/app

[10] Official Website of the Government of the Province of Buenos Aires, Sanitary Emergency, available at https://portal-coronavirus.gba.gob.ar/autotest-coronavirus

[11] *See* in Apple Store: https://apps.apple.com/ar/app/saludec/id1505910803

[12] 24 horas El Diario Sin Límites Puebla, Salud presents portal and app for self-evaluation by COVID-19, March 24, 2019, available at: https://24horaspuebla.com/2020/salud-presenta-portal-y-app-para-autoevaluacion-por-covid-19/

Mexico. Official website of Puebla Government. The Government of Puebla Responds for the Health and Welfare of the Population: https://previenecovid19.puebla.gob.mx/

users find a questionnaire with general data and symptoms that can determine suspected cases.

- **Salud en Sonora**[13]

The Health Secretariat in Sonora (Mexico) presented this app to prevent, detect, and attend to possible cases of COVID-19 in real time, by medical specialists who will be available online and can be consulted by the use of computers or smartphones.

3) Technologies that Organize and Offer Immediate and Real Information to Citizens

- **COVID-19 InfoCU**[14]

It is an app for mobile devices developed by Infomed, with updated and reliable information of the COVID-19. This app, developed in Cuba, feeds on the content available on the site "Coronavirus Infections", and offers professionals in the National Health System and the general population, basic information about the family of coronaviruses, the infections they cause and the pathogen's most recent developments: confirmed cases, associated deaths and affected countries.

- **CoronAPP**[15]

It is an app created by the national Government of Colombia in order to know about the evolution of the disease. Through its use, it is possible to know the behavior of the virus and design containment and prevention measures.

- **Coronavirus Bolivia**[16]

It is an app that includes all the official information about COVID-19 in Bolivia, about prevention and citizens, symptoms, frequently asked questions, emergency numbers, official days, official communications and the latest news.

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[13] Heraldo de México. Salud Sonora app to detect and prevent Covid-19 is presented: https://heraldodemexico.com.mx/estados/plataforma-digital-sonora-coronavirus-covid19/

[14] Infomed Health Network of Cuba official website. Available app developed on COVID-19 developed by Infomed: http://www.sld.cu/noticia/2020/02/27/disponible-aplicacion-desarrollada-por-infomed-sobre-el-covid-19

[15] *See* in Google Play: https://play.google.com/store/apps/details?id=co.gov.ins.guardianes&hl=es_AR https://www.minsalud.gov.co/Paginas/CoronApp.aspx

[16] *See* in Google Play: https://play.google.com/store/apps/details?id=com.agetic.coronavirusapp Government of the Plurinational State of Bolivia's official website: https://www.minedu.gob.bo/index.php?option=com_content&view=article&id=4534:descarga-la-app-coronavirus-bolivia-covid19&catid=182:noticias&Itemid=854

- **Alerta Guate**[17]

It consists of an app, developed by the National Government of Guatemala, so that citizens can receive information about the disease, the number of people infected and those in quarantine.

Asia

1) Emerging Technologies for Contagion Prevention and Detection in Critical Areas

- **Korea Spatial Information & Community**[18]

It is a platform created in South Korea, which has a mapping service that, through the geolocation of devices, assists in the detection of COVID-19. Through the data, it is able to determine the situation of the patients and the places of diagnosis and medical care.

- **Trace Together**[19]

It is a technology developed in Singapore by SGUnited, GovTech and the Ministry of Health that allows to track the close contacts of an infected person during the last couple of days through the use of *Bluetooth*. In addition, it allows the user to have knowledge about the time during which they have encountered them. In this way, if necessary, it is possible to contact them to notify them of the risk of contracting the disease.

- **Hamagen**[20]

This app developed by the national Government of Israel, tracks the whereabouts of a user and then compares it with the known movements of those diagnosed with COVID-19 to verify if they crossed paths within the previous 14 days. After a user installs the app, it tracks their movements and compares the information with data from the Ministry of Health on where those who have been positively diagnosed have been. If the app finds a match (that the user was in the same area at the same time), it connects the owner of the smartphone to

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[17] Government of Guatemala. Government will launch app "Alerta Guate" to inform on COVID-19 https://radiotgw.gob.gt/gobierno-lanzara-app-alerta-guate-para-informar-sobre-el-covid-19/

[18] Spatial Information Portal http://www.nsdi.go.kr/lxportal/?menuno=3085#

[19] Government of Singapore official website. Help speed up contact tracing with TraceTogheter, https://www.gov.sg/article/help-speed-up-contact-tracing-with-tracetogether

[20] The Times of Israel, Health Ministry launches phone app to help prevent spread of coronavirus https://www.timesofisrael.com/health-ministry-launches-phone-app-to-help-prevent-spread-of-coronavirus/

the website of the Ministry of Health to obtain information on what measures to take and how to register to enter the corresponding quarantine.

In this way it helps prevent the spread of the virus, by allowing users to know if they came across someone who was diagnosed with the virus and reveals if they were close to someone with COVID-19.

It was developed when the infections exceeded 1,000 in Israel, where the key strategy to defeat the virus' outbreak was to isolate people who were already infected and who may have been exposed to the pathogen.

- **BMC Combat COVID-19**[21]

This application was developed in Greater Mumbai (India). It uses the geolocation of devices to track the progress of your health and contain the spread of the virus.

- **Self Quarantine Safety Protection**[22]

This technology, developed in South Korea, allows the government to monitor citizens while they are in quarantine. Through the use of GPS, it allows to know if they have left the area assigned to them and sends alerts both to those who breach the isolation and to the corresponding authority.

This app has been recognized as an example of significant policies since it has allowed South Korea to have a greater knowledge about the spread of the disease in their country.

2) Emerging Technologies for Diagnosis and Medical Care

- **Vocalis Health**[23]

It is an AI-based technology developed in Israel, that uses the voice to detect and monitor health status. It works with large volumes of data to analyze the health of the population. This application allows to identify the vocal footprint of patients with COVID-19.

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[21] *See* in Apple Store: https://apps.apple.com/ar/app/bmc-combat-covid19/id1504083673

[22] MIT Technology Review, South Korea is watching quarantined citizens with a smartphone app, March 6th, 2020, available at: https://www.technologyreview.com/s/615329/coronavirus-south-korea-smartphone-app-quarantine/

El Español, This is the App that has Stopped Coronavirus in South Korea. March 15, 2020, available at: https://www.elespanol.com/omicrono/software/20200315/app-frenado-coronavirus-corea-sur/474454544_0.html

[23] Vocalis Health official website: https://vocalishealth.com/

Infoleg, Israel tries an innovative app to identify the vocal " footprint" of coronavirus patients, March 24, 2020, available at: https://www.infobae.com/america/tecno/2020/03/24/israel-prueba-una-innovadora-aplicacion-para-identificar-la-huella-vocal-de-los-pacientes-con-coronavirus/

Europe[24]

1) Emerging Technologies for Contagion Prevention and Detection in Critical Areas

- **Home Quarantine[25]**

It is an app developed by the Polish National Government that allows the police to control that people so that they do not breach quarantine. Once users activate the app, they enter their phone number and they must take a reference photo - selfie style. The app will send unscheduled requests for a new photo to be sent. The system verifies both the person, through facial recognition and their location, replicating what would be a visit from a police officer.

The application also gives access to relevant health information and a direct line of communication.

- **FHI APP[26]**

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[24] The European Parliament approved on April 17, 2020 a resolution on the coordinated EU action to combat the COVID-19 pandemic and its consequences (2020/2616 (RSP) where "Takes note of the emergence of contact-tracing applications on mobile devices in order to warn people if they were close to an infected person, and the Commission's recommendation to develop a common EU approach for the use of such applications; points out that any use of applications developed by national and EU authorities may not be obligatory and that the generated data are not to be stored in centralised databases, which are prone to potential risk of abuse and loss of trust and may endanger uptake throughout the Union; demands that all storage of data be decentralised, full transparency be given on (non-EU) commercial interests of developers of these applications, and that clear projections be demonstrated as regards how the use of contact tracing apps by a part of the population, in combination with specific other measures, will lead to a significantly lower number of infected people; demands that the Commission and Member States are fully transparent on the functioning of contact-tracing apps, so that people can verify both the underlying protocol for security and privacy, and check the code itself to see whether the application functions as the authorities are claiming; recommends that sunset clauses are set and the principles of data protection by design and data minimisation are fully observed".

[25] Privacy International, Poland: App helps police monitor home quarantine, March 19, 2020, available at: https://privacyinternational.org/examples/3473/poland-app-helps-police-monitor-home-quarantine
Government of Poland official website: https://www.gov.pl/web/koronawirus/kwarantanna-domowa
https://www.businessinsider.com/poland-app-coronavirus-patients-mandaotory-selfie-2020-3

[26] NRK, Status koronaviruset: https://www.nrk.no/korona/status/
NRK, FHI-app skal lagre info om dine bevegelser i 30 dager, available at: https://www.nrk.no/norge/fhi-app-skal-lagre-info-om-dine-bevegelser-i-30-dager-1.14963187
FHI, Develops the App for Infection Detection. March 27, 2020, available at: https://www.fhi.no/nyheter/2020/utvikler-app-for-smitteoppsporing/

It is an app developed in Norway used to track coronavirus infection voluntarily from the movements of all the individuals who choose to use it.

Once installed, the application collects data using the GPS and *Bluetooth*. The data is stored in the cloud. If a user is found to be infected, it will be possible to trace phones that have been in close contact with the person for the past 14 days. With the data obtained, a notification is sent to other app users that have been close to the infected person to start quarantining.

- **App COVID-19.EUS**[27]

The Basque Government (Spain), together with the Basque company EricTel, has developed COVID-19.EUS, whose objective is to weave a CITIZEN NETWORK that helps in the containment of the coronavirus, contributing to its prevention, detection and monitoring. COVID-19.EUS uses the same monitoring model of the WHO and the European Center for disease control and was created with the aim of becoming a social network, with the following objectives:

- *Prevent:* Each person can download it, add their health status through a self-diagnosis and can add family, friendships or work/educational contacts to their close circle. In this way, all individuals are interconnected, receive the usual recommendations, monitor their health and see the state of others.

-*Increase follow-up of at home cases*: In this way, it allows for the Department of Health and Osakidetza to obtain greater knowledge and follow-up of people with symptoms who are at home, always executed in an anonymous manner. This represents an important step forward, to provide better and closer care, as well as to focus efforts on those who need it most.

-*Provide support to the health professionals* who will provide daily coverage to people in quarantine with mild or moderate involvement, to try to anticipate a possible aggravation. Health professionals will solve your doubts on a daily basis and aid in reducing anxiety.

-*Analyze case concentration:* It will serve as a reinforcement for the work of the epidemiology teams, which will be able to locate the places where the cases are situated and thus carry out, if necessary, more individualized diagnostics and monitoring interventions in areas of high transmission.

- **Ranking C-19**[28]

It is a government's official app in Iceland that collects the GPS location of mobile devices in order to mitigate the pandemic. If the owner of the device is infected with COVID-19, the Health

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[27] Health Department, Transparency Regarding the New Coronavirus (COVID-19) https://www.euskadi.eus/coronavirus-app-covid-eus/web01-a2korona/es/

[28] *See* in Apple Store: https://apps.apple.com/ar/app/rakning-c-19/id1504655876

Department will ask him to share the location data for contact tracing in order to identify people who may need to be quarantined.

- **Stop Covid 19 Cat**[29]

This app developed in Catalonia (Spain), uses the geolocation of mobile devices to track infected individuals and, in this way, take advantage of the data to develop public policies based on the evolution of the pandemic. It generates heat maps according to the collected data that allow health authorities to locate possible risk cases and thus avoid possible contagions.

This is possible since it offers a questionnaire that allows citizens to know if they are at risk of contracting coronavirus, as long as they allow the application to collect their geolocation data. In this way, it is possible to decongest the attention lines and, in the event that a risk is detected, and the health personnel may intervene.

- **CoronaMadrid**[30]

It is an application developed in the Community of Madrid (Spain) that allows people to carry out self-evaluations through a questionnaire to determine the risk of COVID-19. For this, the user must enter the data, which then the Ministry of Health is authorized to use. After the evaluation, the person is instructed on how to continue according to the diagnosis.

Both the website and the app allow for the use of the user's geolocation, provided they activate this functionality, with the objective of better organizing healthcare resources to achieve a more agile and effective response in each particular case.

2) Emerging Technologies for Diagnosis and Medical Care

[29] Rtve, CoronaMadrid and STOP Covid-19 CAT, the First Official Coronavirus Self-Diagnosis 'Apps". March 24, 2020, available at: https://www.rtve.es/noticias/20200324/coronamadrid-stop-covid-19-cat-aplicaciones-creadas-para-descongestionar-telefonos-emergencia/2010679.shtml
Esmartcity.es The StopCovid19Cat App Allows Monitoring of People with Coronavirus in Catalonia. March 23, 2020, available at: https://www.esmartcity.es/2020/03/23/app-stopcovid19cat-permite-hacer-seguimiento-personas-coronavirus-cataluna
See in Google Play: https://play.google.com/store/apps/details?id=cat.gencat.mobi.StopCovid19Cat
Canal de Catalunya, Stop COVID CAT http://canalsalut.gencat.cat/ca/salut-a-z/c/coronavirus-2019-ncov/stop-covid19-cat/
[30] CoronaMadrid official website: https://www.coronamadrid.com/
Medical Redactions, Coronavirus: Madrid launches the 'Coronamadrid' app to diagnose infect, March 24, 2020, available at: https://www.redaccionmedica.com/autonomias/madrid/coronavirus-madrid-lanza-la-app-coronamadrid-para-diagnosticar-contagios-4958

- **Stopp Corona**[31]

It is an app developed by the Red Cross (Vienna) that allows to carry out a digital self-test. Its peculiarity lies in that it allows people who know each other and use the app, to be able to select each other if they have met. If one of them is diagnosed or has symptoms compatible with COVID-19, a message will be sent automatically to all people who have registered encounters with them. With this tool, meetings with friends, family or colleagues can be saved quickly, easily and anonymously.

- **Asistencia COVID-19**[32]

It is an application developed by the national Government of Spain that allows self-evaluations to be executed through a questionnaire, to find out the health status of the user. After evaluation, the user is advised on what to do and it offers recommendations.

- **COVIDOM**[33]

It is an application designed in France for home medical monitoring of patients with or suspected of being infected with COVID-19 who have passed through certain Paris hospitals, but do not require hospitalization. Every day, the patient receives a medical questionnaire and, in case of acute symptoms, a medical care team is alerted. The objective is to guarantee remote monitoring of patients and to prevent the overload of health facilities.

During the consultation, the doctor creates the patient's profile on the platform, then the patient must answer the questionnaire daily. The frequency depends on the risk and the period of time. Depending on the response, alerts can be generated, for example, in case of high fever or significant respiratory distress, the medical team receives an alert and then will communicate with the patient. In the event of an immediate emergency, you are required to contact the emergency telephone number indicated directly.

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[31] *See* in Apple Store: https://apps.apple.com/at/app/apple-store/id1503717224
Stopp Corona official website: https://participate.roteskreuz.at/stopp-corona/
Data Protection in Austrian Red Cross, available at: https://www.roteskreuz.at/datenschutz
[32] Spain. Government official website; Asistencia.COVID19 https://asistencia.covid19.gob.es/
[33] French Public Service., Covidom App: Remote Monitoring of Patients With or Suspected of COVID-19, March 18, 2020, available at: https://www.service-public.fr/particuliers/actualites/A13927