



# Comprehensive Analysis of Covid 19 impact and detection mechanisms

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## Abstract

This work of dissertation conducted the exhaustive analysis of Covid 19. This pandemic causes devastating effect on human race. The entire work is presented within sections. In the first section, Covid 19 and its origin is described. Along with this, use of technology for the identification of Covid 19 is presented. Role of technology especially data mining is considered in the field of detection of Covid 19 at early stage. The second section present the literature survey of the tools and techniques used for identification and rectification of Covid 19. Various variants of Covid 19 are also presented through the literature. Next we described the problem definition that exists within existing literature. After this objective of study is presented in comprehensive way. Section 5 presents the proposed methodology including the dataset and algorithms used for the detection and prediction of Covid 19.

Keywords: Covid 19, technology, data mining

## INTRODUCTION

The virus that causes COVID-19 are known as Coronaviridae. W.H.O. was informed and identified about unknown cause in Wuhan city, China in the Month of December 2019 after December, Chinese authorities identified and give temporary named to this virus as '2019-nCoV'. A coronavirus identified in 2019, SARS-CoV-2, has caused a pandemic of respiratory illness, called COVID-19 as COVID-19 is a communicable infectious disease caused by the SARS- CoV-2 virus. This disease will direct attack on the respiratory system of the infected person who is suffering with this disease.

Moreover, some people recover without special treatment and some people get seriously ill as a result they required special treatment as well as medical attention. People who have medical complication like diabetes, cardiovascular problems, cancer and chronic respiratory disease more likely to develop serious problem that can be fatal too. Old age people also have high risk of infection with this disease. People who are suffering with this problem can also develop a bacterial infection as a complication and antibiotics may be recommended by a health care provider but in some case, antibiotics do not work against viruses. Furthermore, there is currently no licensed medicine to cure COVID-19.

The symptoms of this disease cause illness ranging from the common cold to more severe disease. This virus can be spread from infected person's mouth, nose to other in the form of small liquid particles and the size of the particle range from larger respiratory droplets to smaller aerosols. Larger droplets fall on ground but tiny particles remain in the air and get accumulate in the places where many people get gathered and the ventilation is poor. Moreover, there are many symptoms of corona virus which may includes Respiratory symptoms, Fever, Cough, Shortness of breath, Breathing difficulties, Fatigue and sore throats, chills, diarrhea, headache etc. There are many people who are suffering with corona virus but have no symptoms; however, in some people corona virus can lead to lung failure, respiratory disease, Difficulty breathing or shortness of breath, persistent pain or pressure in the chest, new confusion or inability to arouse, bluish lips or face, and kidney failure or in some cases it causes death. This virus can spread by coughing and sneezing up to 2 to 3 feet, by personal contact with infected person, by objects that get contaminated with infectious droplets.

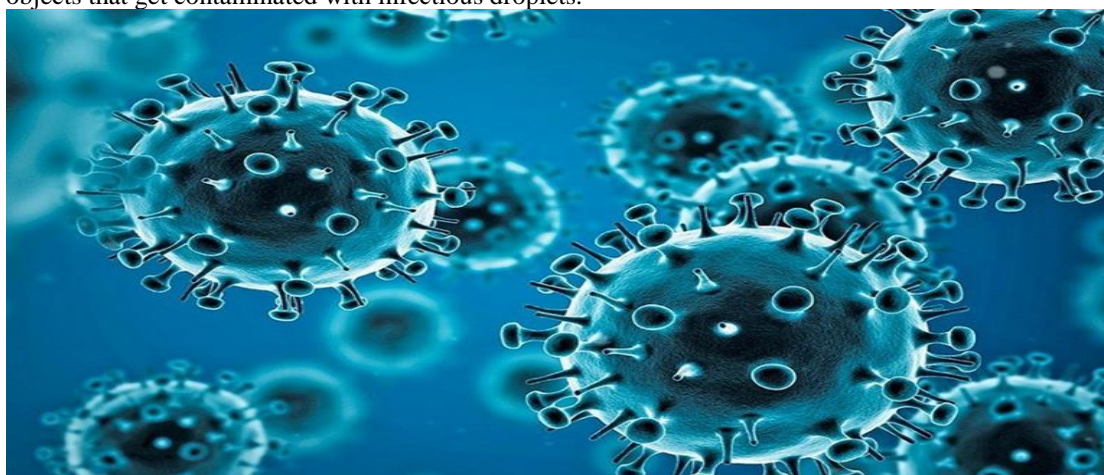
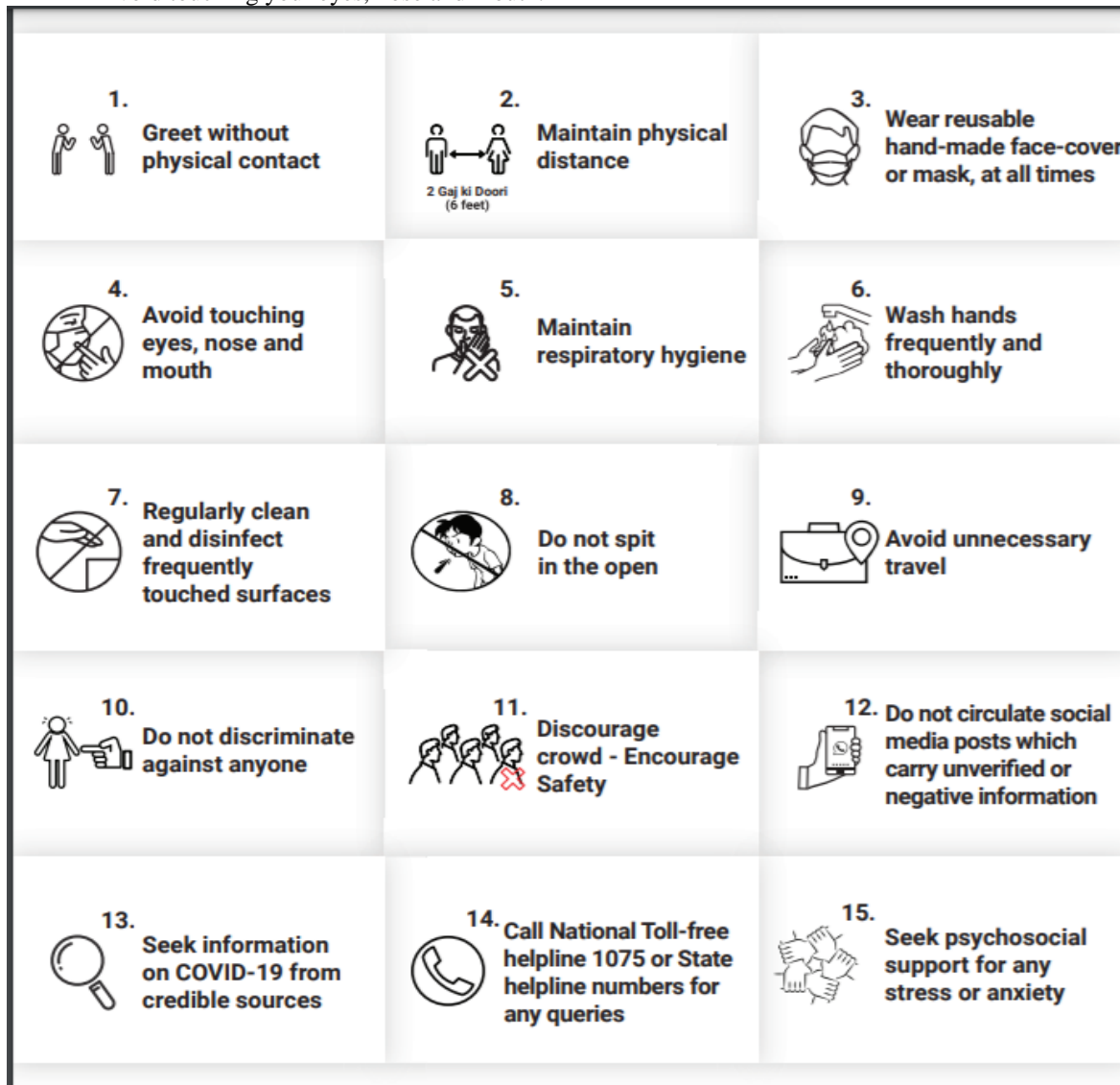


Figure 1: Corona virus

During Covid-19 pandemic government of every country aware their citizen with some advice that are useful for prevent from this disease are:

- Alcohol-based Hand sanitizers can be used often.
- Washing the hands frequently with water and soap after the contacting other person.
- Wear mask while contacting another person.
- Maintaining social distancing about 1 meter between yourself and anyone who is coughing or sneezing.
- Following respiratory hygiene as covering mouth and nose with your folded elbow or tissue when you cough or sneeze.
- Seeking medical care early if you have fever, cough and difficulty breathing.
- Follow advice given by health care provider and national and local public health authority.
- Stay up to date with the latest information on the COVID-19 through WHO updates.
- Avoid touching your eyes, nose and mouth.



**Figure 2: Rules to prevent from Corona virus**

This virus infects people of all ages; however, some evidence suggest that four groups of people are at higher risk of getting severe COVID-19 disease like older people, people with serious chronic illness (Diabetes, Cardiovascular disease, Chronic respiratory disease, cancer, Hypertension and Chronic liver disease), children and people who are physically inactive. W.H.O. advice for high-risk populations.

Due to covid-19 pandemic world tourism industry is affected very much. Tourists face very risk for travel destinations and to make management perceptions is very crucial matter in their decision during the ongoing covid-19 epidemic. This epidemic risk influences their psychological behaviour to make choice of travel destination. Tourists are avoiding the destinations which are considered as highly risky. They are avoiding the places which are hotspots of corona virus.

During the covid-19 pandemic government impose lockdowns at the highly scale around the world to control the spread of this highly disastrous corona virus pandemic. This pandemic change many of the aspects of human life and business which also includes tourists' management as in past half of the population adopted restrictions on the movement and coming out from their homes. The lockdowns help the countries to stop the spreading of infectious virus this highly effect the tourism industry, economic development and increase the unemployment rate which impact the financial, sociocultural, global, political and technological issues.

Many behavioural changes have been seen during this pandemic in society are as follow:

- Inclined in Digital platform: during this critical situation of COVID-19 pandemic people are adopting digital platform rather than offline platform on daily day to day activities.
- Changing in purchasing behaviour: during this pandemic people are more likely to purchase online instead of online.

- Increase awareness of health: during covid-19 people are more aware about their health, they are using different exercise, yoga and wear mask in public gathering increase hygiene and favour healthy eating etc.
- Changes in mobility pattern: during the covid-19 there is less use of public transportation due to lockdowns and curfews and there is more remote working that is work from home.

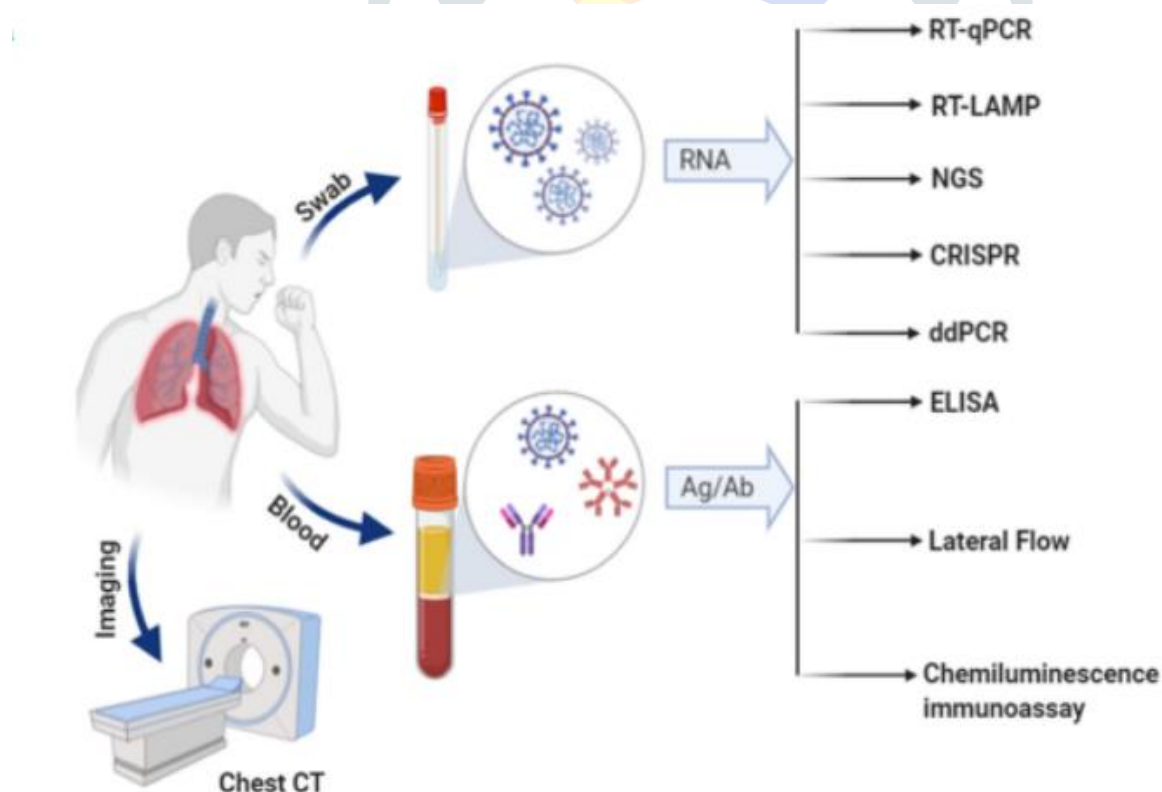
Digital Adoption	Mobility	Finance	Health	Interpersonal relation
Use of Social platform	Use of merged flexibility	E- shopping	Rise in Health	Rise in Pet Adoption
Online education	Less use of public transportation	Value based purchasing	Wearing mask	Increase divorce
Work from home & video conferencing	Remote /digital work	Shifted to cashless society	Eating healthy food	More family time was taken out
Use of food delivery apps	Change in use of commercial real estate	Purchase only required item	Telemedicine	Increase Family cooperation
Digital entertainment	-	-	Using alcohol-based sanitizers	-

In general, from past analysis, it is clear that human's movement and interactions with others contributes to the spread of infectious virus during pandemic so travel patterns are restricted whenever the country is facing the pandemic situations to control the spread of infection. Various control and preventing measures are imposed by the government of different countries. Many strategies are imposed such as closure of the schools, online teaching and closure of shops, restaurants, hotels and banquet halls. Lock down in countries or cities imposing curfews, restriction on public gathering, closing international flights, making public transport and taxis to limit travels. Imposing different norms such as wearing mask, maintaining social distancing and work from home. These policies not only affect the peoples travel behaviour but also affect their mental, social, behavioural health and well-being.

During the pandemic people face the higher risk for infection so they avoid travelling to places where they can perceive infection. People have various travel needs and, in this case, trips range from daily grocery shopping trips to work trips. Different countries are imposing different travel restrictions and such policies could affect travel behaviour of the public.

#### TECHNOLOGICAL TECHNIQUES WHICH ARE USED FOR DETECT COVID-19 (DATAWAREHOUSE)

Due to technological advancements, there are ample of technological devices or kit that are significant techniques used to diagnose covid virus which include RT-qPCR, NAAT, CRISPR-based diagnosis, Cartridge-based nucleic acid amplification test and TrueNAT (CBNAAT) and Computed tomography.



**Figure 3: Schematic representation of various analytical methods available for SARS-CoV-2 detection**

1. **Computed tomography (CT):** It is an electronic device also known as CT scan especially used to control the motion of the X-ray source and detectors, processes the data, and produce the image as a result. During covid-19 it has been used to diagnose covid infection by doctors during treatment.



2. **Nucleic acid amplification test (NAAT):** A NAAT is a test used to detect a particular nucleic acid sequence and virus or bacterium in blood tissue, urine etc.
3. **Reverse transcriptase real-time polymerase chain reaction (RT-qPCR):** it is a laboratory technique merge reverse transcription of RNA into DNA.
4. **CRISPR-based diagnosis:** it is a powerful technology especially detect the DNA sequence of genomes of all organisms on Earth.
5. **Cartridge-based nucleic acid amplification test and True NAT (CBNAAT):** it is a chip-based RT-PCR test for the semi-quantitative detection of beta-coronavirus and SARS coronavirus RNA.

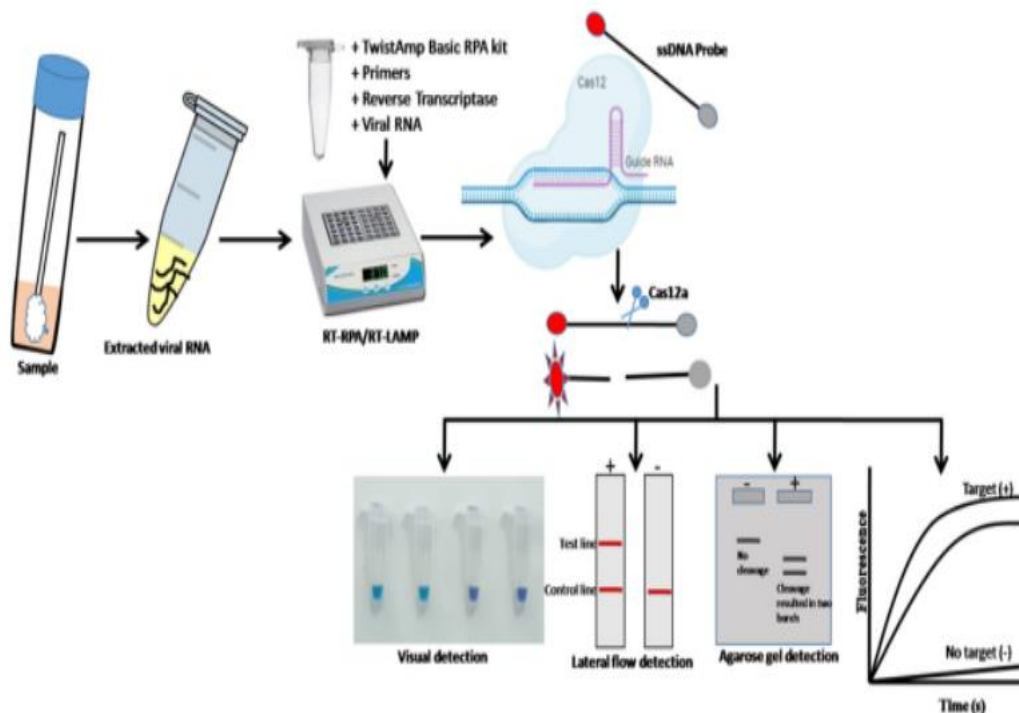


Figure 5: schematic representation of CRISPR-cas12a based SARS-CoV-2 detection assay

## 2. LITERATURE SURVEY

(Website, 2020), this website describes the behavior of omicron variant that have been reported by W.H.O. as well as when and where the omicron variant is detected first. Moreover, it also presents the number of effects and information about the Omicron Variant such as How easily does Omicron spread? causes of more severe illness, will vaccines work against Omicron? And will treatments work against Omicron? Moreover, it also describes about many concerning tools to fight Omicron like covid-19 vaccines which is the best public health measure to protect people from covid-19, Masks also offer protection against all variants, and various tests can help people if they are currently infected with COVID-19.

(Brodeur *et al.*, 2020), this paper presents the review of the Economics of COVID-19 consequences and government action concerning with the same. This survey also provides an overview of data sets used to measure social distancing and covid-19 cases, effects on global economy, socio-economics consequences of COVID-19 and government action and discuss policy and proposals. This paper compares all the research of different country related with economic consequences on society.

(Mustafa, 2020), this paper discusses a newly identified coronavirus, SARS-CoV-2, that is spreading all over the world. It also discusses the various problems and number of cases occurring during covid-19 such as child mortality, natural disasters, poverty, and about 100 other problems. Furthermore, the aim of this paper is to focus on various global problem with large outbreaks in different countries like China, south Korea, Iran, Italy and more than 180 countries.

(Nadeem, 2020), this paper discussed about the history of corona virus which may include origin of covid-19 in the Wuhan province of China, how fastly, it has been spread and main focus of this paper is to give the detail of different journal concerning with the covid-19.

(Bick, Blandin and Mertens, 2020), this paper shows the research of 5000 working age adults, and identified that 35.2% of the work are done by employees at their own place that is work from home. Work from home is the best way to shift their work from remote area to home area. Moreover, a large majority that 71.7% of US worker that could work from home effectively. It also shows the results before covid and after covid work consequences and commuting behaviour.

(World Health Organization, 2021), this paper is concerning with World Health Organization which presents the impact of covid-19 on health and care workers. It also involves the background of corona virus, the uncertainties around the magnitude of covid-19 deaths, methods, Results Discussion concerning with covid-19, and limitations. In this paper, factors and effects of covid-19 are also discussed which may include Availability and distribution, Health, Working Condition and Social and well-being.

(Pathak, 2020), the main aim of this paper is to identify the coverage of publication on SARS-CoV-2 in various databases. It also discusses different Indian publications in Dimension of journal and institutions. It also index more than 742 publications with 196 citations. It also compares the result of this study in different top 10 countries like USA, England etc.

(Pokhrel and Chhetri, 2021), this paper discuss, the impact of covid-19 pandemic on Teaching and Learning. The main focus of this paper is to present the largest disruption of education systems in human history that affect 1.6 billion learners in more than 200 countries. Moreover, the research reveal that more than 94% institution, school and university are influence by covid-19; however, reopening of schools after relaxation of restriction is another challenge with many institutions and school. This

paper also include pedagogy for continuing Education Through Online, Challenges in Teaching and Learning, opportunities for Teaching and Learning and many problems concerning with covid-19 pandemic.

(UNWTO, 2020), the main purpose of this paper is to discuss the covid-19 pandemic statistical report that how covid-19 is changing the world. During this critical situation many researchers of the world, work together to identify the affected sector from covid-19 like governments, epidemiologists, schools, community, entrepreneurs and families. It also includes the Economic Impact such as banking system, major crises, employment shock, fall in trade and commodity prices, trade in medical goods, decline in global manufacturing, challenges for tourism, and international postal services disrupted. Social impact includes risks for agriculture and food, migration in a time of travel restriction, Human rights in a pandemic, Human development during covid-19, Pollution and waste, Schools out, impact on drugs and homicides, different impact on women, and impact on poverty. Regional impact focus on economic impact of covid-19, regional policy actions, impact on statistical activities, sharp decline in GDP, and Risk on health and wealth. In this paper, statistical impact focus on producing economic statistical during covid-19, innovation cooperation, statistical capacity squeezed and 2020 census at risk.

(FAO & WFP, 2020), this paper discusses the impact of covid-19 on food security and nutrition. The food security and nutrition risks are serious issue during covid-19 pandemic. One of the research projects shows that about two billion people in the world faced food insecurity. Moreover, it includes effects of covid-19 on food security and nutrition, supply chain disruption, global economic recession and associated income losses, widening societal inequities, disruptions to social protection programmes, altered food environments, localized food price increases, potential for changes in production.

(Hanushek and Woessmann, 2020), the main aim of this research is to presents the impact of learning losses due to covid-19 pandemic. This research involves lost learning during times of closed schools, Economic effects of lost learning, distributional issues, aggregate losses in GDP across various nations, and making up for learning losses.

(Fairlie, 2020), this paper presents the impact of covid-19 on small business owners. During covid-19 pandemic small business affects most in different countries. Research shows that the largest drop in business record seen in almost all industries and in incorporated business in different countries like USA, Africa, and Asian countries. Female-owned business also influenced by covid-19 and it declined by 25 percent.

(United Nations Office on Drugs and Crime, 2020), this paper shows the vaccines and corruption risks associated with covid-19 during the manufacturing, allocation and distribution of vaccines. In different part of the world. Covid-19 vaccines being approved for use in various parts of the countries in the world, this will also present corruption risks that may have major and threatened effects on public health goals which include entry of substandard and falsified vaccines into markets, theft of vaccines, nepotism, favouritism, and corrupted procurement systems. This paper also focus on corruption risks, vaccine deployment and weak or non-existent distribution system, corruption risks in vaccine procurement, corruption risks in emergency funding, the production of substandard and falsified vaccines, corrupt vaccine policy decisions, Immediate domestic response measures, Measures to reduce corruption risks, and transparent criteria for priority vaccine recipients and public information about vaccine programmes, secure storage and distribution systems to mitigate corruption risks, conduct corruption risks assessments, strengthen civil society participation, protection of journalists and whistle-blowers, upholding the right to health, strengthening anti-corruption laws and policies, identifying and protecting vulnerable individuals and communities and comprehensive auditing, oversight, accountability and reporting mechanisms to monitor the disbursement process and verify appropriate receipt.

(Kabha *et al.*, 2020), this paper presents the impact of fake news and myths related to covid-19. During lockdown internet and social media networks have particularly emphasised in terms of the news being spread online. However, the original news is converted into fake news which has drastic change in the real information. This paper include clarifying fallacy in news and information, reasons and impacts of fake news, fake news and myths in covid-19, impact of fake news on general public, hedging against fake news and its effects.

(Yasmin, Khalil and Mazhar, 2020), the aim of this paper is to discuss the impact on effective learning and stress management among students. During covid-19 pandemic people of all age group suffer with different health problem like anxiety, depression, fear of loosing life, fear of loneliness, fear of virus. This paper focus on how student get affected during covid-19 pandemic. It includes symptoms and signs of stress like physical symptoms, emotional symptoms, cognitive symptoms, and Behavioural symptoms. Level of stress includes episodic stress, Acute stress, chronic acute stress, time stress, anticipatory stress, situational stress, and encounter stress. The main focus of this paper is to discuss stressors among students during covid-19 and their solution which includes ways to handle stress from class scheduling and credit load, ways to overcome grade and exam stress, ways to plan your future and avoid stress, tips to maintain your health as a student, ways to balance relationships in college, ways to overcome stress from finances, managing stress as a student, ways to balance family, school and work. It also elaborates unhealthy ways to manage stress like smoke, use of drugs or drink, spend compulsively, over and under eat, ignore the stressor, procrastinate with social media; however, there are some healthy ways to manage stress like confront the stressor, time management, being organised, exercise, nutrition, sleep, spend time with family and friend, take a break, and get professional support, etc

### 3. Problem definition

Covid 19 is a pandemic that is affecting multiple persons at a same time. This issue is aggravated as the people does not follow the rules and regulations regarding Covid 19. The issue can be resolved or tackled if this issue can be detected or predicted at early stage. Covid 19 detection can be detected using the facility provided within machine learning. The detection must not take extra time otherwise multiple persons can be infected. The problems associated with Covid 19 is detection rate with accuracy. Rest of the issues are highlighted as under

- Detection of Covid 19 at early stage is crucial as it can infect multiple persons at one time.
- Using technology for Covid 19 prediction ca reduce the affect of covid on unaffected persons.
- Reducing noise and outlier from the dataset is crucial that must be tackled to increase classification accuracy.
- Reducing execution time in prediction irrespective of the size of the dataset is also crucial.

### 4. Objective of study

Covid 19 cases are increasing day by day. Although vaccination is available but still it is not that effective in avoiding the Covid 19 virus. It only can reduce the adverse effects of Covid. Detecting Covid 19 cases at early stage can reduce the infection

spread. The objective of study is to discover the Covid 19 at early stage. The detection process will be divided into phases. According to the phases, objective of study is given as under

- To detect outlier and noise within the dataset. Noise handling mechanism includes mode-based approach for replacing missing values and outlier detection includes z-score based method.
- To train the model with linear regression-based mechanism.
- To predict the Covid 19 cases with high classification accuracy.
- To compare different classifiers for the detection of Covid cases.

## 5. Methodology of study

The methodology section provides the details of steps followed to achieve the desired objectives. The used dataset and simulation setup is also described within this section. The used dataset is described within the section 5.1

### a. Dataset Used

Dataset is derived from the Kaggle website. This website provides benchmark datasets. It is derived through the link <https://www.kaggle.com/sudalairajkumar/novel-corona-virus-2019-dataset>. The structure of the dataset is given as under

SNo	ObservationDate	Province/State	Country/Region	Last Update	Confirmed	Deaths	Recovered
1	1/22/2020	Anhui	Mainland China	1/22/2020 17:00	1	0	0
2	1/22/2020	Beijing	Mainland China	1/22/2020 17:00	14	0	0
3	1/22/2020	Chongqing	Mainland China	1/22/2020 17:00	6	0	0
4	1/22/2020	Fujian	Mainland China	1/22/2020 17:00	1	0	0
5	1/22/2020	Gansu	Mainland China	1/22/2020 17:00	0	0	0
6	1/22/2020	Guangdong	Mainland China	1/22/2020 17:00	26	0	0
7	1/22/2020	Guangxi	Mainland China	1/22/2020 17:00	2	0	0
8	1/22/2020	Guizhou	Mainland China	1/22/2020 17:00	1	0	0
9	1/22/2020	Hainan	Mainland China	1/22/2020 17:00	4	0	0
10	1/22/2020	Hebei	Mainland China	1/22/2020 17:00	1	0	0
11	1/22/2020	Heilongjiang	Mainland China	1/22/2020 17:00	0	0	0
12	1/22/2020	Henan	Mainland China	1/22/2020 17:00	5	0	0

Table 1: Sample Dataset

This dataset contains 306430 entries. Hence it is categorized as large dataset. Initially this dataset is loaded and checked to determine it is successfully loaded or not.

### b. Simulation Setup

The simulation is conducted within Jupyter notebook. The notebook is installed with ANACONDA 4.0. The notebook uses the python version 3.0. The CSVreader library is installed within the Jupyter using the following command

Conda install csvreader

The result plotting is done using matplotlib library. This library is also installed using the following command

Conda install matplotlib

The additional libraries are installed for training and testing. The training and testing module libraries are loaded using the following command.

Conda install numpy

Pandas library is already present within the python package and plotly is used for for visualization purpose. The library is installed using the following command

Conda install plotly

## 6. CONCLUSION

Due to the global covid-19 pandemic tourist industry gets highly affected so the industry needs to overcome from it. From this it is concluded that Covid- 19 influence travel habits, and people are avoiding traveling in groups and being surrounded by groups of people. They are also avoiding the risk of travelling without travel insurance. Covid- 19 pandemic has drawn the attention of public to the issues of hygiene and health. Hygiene and health conditions become the important factors in choosing the destination for travel. Due to tourist's fear, travelling industry should improve the hygiene and health conditions, so that tourists gain confidence.

Due to covid- 19 pandemic, tourists are facing economic crisis so they are more concern for spending on travel. Thus, to attract tourists even after the covid- 19 crisis, it is important to give offers. Tourists say that they will avoid eating outdoors they will involve in respecting nature and become more responsible tourists. Tourists are seeking more information for their next trip. So, it is recommended that tourism managers should focus on the media strategy, cultivate positive images and stimulate tourism during and after the covid- 19 pandemic. It is the responsibility of manager to build customer loyalty by changing their perception of travel in the low season.

It is essential to conduct research on consumer psychology to understand and predict the direction in which tourist behaviour change will take place. For recovery of the tourism industry tourists' priorities are fulfilled which include Tourist industry should restore traveller's confidence, they should promote domestic tourism and support the tourism safe return from international flights, they should provide clear information to the traveller. they should strengthen the cooperation within and between the countries, and they should build more resilient and sustainable tourism.

The positive news on vaccines has boosted the tourists hope. Vaccine's rollouts take some time and after that tourism industry starts potentially. As the immediate impacts of lockdowns, curfews and containment raised now the countries are moving toward the balance. They are making special quarantine centres for lowering the risk. The travel industry has faced so many difficulties after covid-19 pandemic so many companies has accepted the chance of digitization and become successful in changing the environment now the information reaches to millions of people instantly due to internet. Covid-19 has caused



catastrophic decrease in the tourism demand many countries that have affected by the virus now begin to manage the health protocols and issuing the policies to prevent the spread of decrease countries has enforced quarantine prohibition of travellers such situations reduce the traveller's intention to travel it has been concluded that covid-19 generally impacted the traveller's intention. The tourists feel that it impacts their daily life and work it also impact the business travel and domestic travel that has preplanned they changed the travellers plan and now the travellers are more careful in choosing destination and travel partners. Hygiene and safety have an important role in reducing the effect of covid-19 pandemic and caring a campaign to prevent the spread of corona virus and educate the people so they can adjust themselves with new regulations to maintain safety after the covid-19 pandemic is over.

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