Java Institute for Advanced Technology

UNIT NAME: - OBJECT ORIENTED SYSTEM ANALYSIS AND DESIGN

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Artificial Intelligence for COVID_19 Pandemic

Introduction

Coronavirus disease (COVID-19) is a respiratory ailment that can spread from individual to individual. first recognized during an outbreak in Wuhan , China.The coronavirus disease (COVID-19) pandemic has caused extreme strains on health systems, public health infrastructure, and many countries' economies.Peoples at higher peril for sickness are the those who live in or have starting late been in a zone with advancing spread of COVID-19.A few patients have pneumonia in the two lungs, multi-organ failure and sometimes death.Coughing, or sneezing, droplets sprayed from the COVID-19 patients were the most common coronavirus transmission mode.The clinical symptoms of COVID-19 patients are fever, cough, shortness of breath, chills, trembling, muscle pain, headache, sore throat, loss of taste or smell, etc.Severe patients often develop dyspnea or hypoxemia 1 week after the onset.The number of affected countries, areas, or territories was 223. More than billions of people were staying home to avoid SARS-CoV-2. At the same time, a large number of problems emerged (6). For example, the number of hospital beds and doctors was scarce. Protective equipment was lacking, and there were no specific drugs. How to disinfect to protect medical staff was also essential.The best way to deal with the SARS-CoV-2 infection is to control the source of infection, diagnose, report, isolate, support treatment, and release epidemic information in time to avoid unnecessary panic.

There is an urgent need to explore a high-efficient way to assist human experts in overcoming the COVID-19 Pandemic. Alternatively, multiple data artificial intelligence (AI) can be used.

- AI could analyze the epidemiological characteristics, clinical characteristics, and treatment effects of COVID-19 through extensive data of clinical cases.
- AI was also used for quantitative digital analysis of medical images and guide diagnosis.
- It solidified the expert's knowledge system into the model.
- The number of learning samples increased, the accuracy of the analysis increased.
- It could guide the identification and treatment of the COVID-19 patients.

The main AI applications in six areas,

- Epidemiology
- Diagnosis
- Progression
- Treatment
- Psychological health impact
- Data security

Epidemiology

Trajectory tracking and infectious rate control

- Early case identification, quarantining, and preventing exposure to the communities COVID-19 Pandemic.
- Travel information, social information, consumption information, and exposure history, AI could establish the network of potential infections.
- Combining the time when the infected person was diagnosed and the spatial location information of their close contacts.
- It indicated that using a centralized model for digital contact tracing was more effective than the decentralized model.

Uncovering climatic/geographic/social factors of COVID-19 spread

- COVID-19 Pandemic was showing climatic and geographic patterns in its spread and development.
- The climatic influence on COVID-19 transmission risks.
- Among the tropical countries, COVID-19 in Indian cities is most affected by mean daily temperature and those in Brazil by temperature seasonality.
- It demonstrated that countries in high latitudes with temperate or continental climates were the most vulnerable to this outbreak.
- Differences in lockdown, quarantine, and social distancing may also contribute to differences in the severity of the COVID-19 Pandemic.
- The trained model analyzed the connection between population flow and cross-regional infection strength.
- Used an AI framework based on policy interventions' timeline.

Diagnosis

AI applications in

- Diagnosis areas
- Laboratory-based diagnosis,
- Medical image diagnosis,
- Respiratory pattern,
- Symptoms diagnosis.

Progression

The AI screening research can detect early COVID-19 cases and improve the doctors' diagnosis.

AI applications in the disease progression are also critical,

- Helping medical staff find and treat high-risk patients early
- Estimate ICU events
- Formulate treatment plans
- Allocate medical resources
- Reduce mortality

Treatment

AI can apply to the four stages of drug development,

- Drug discovery
- Preclinical research
- Clinical research
- Marketing approval

This section focuses on AI applications in,

- The COVID-19 treatments
- Drug designing
- Drug repurposing
- Herbal drugs
- Vaccine development

Psychological health impact

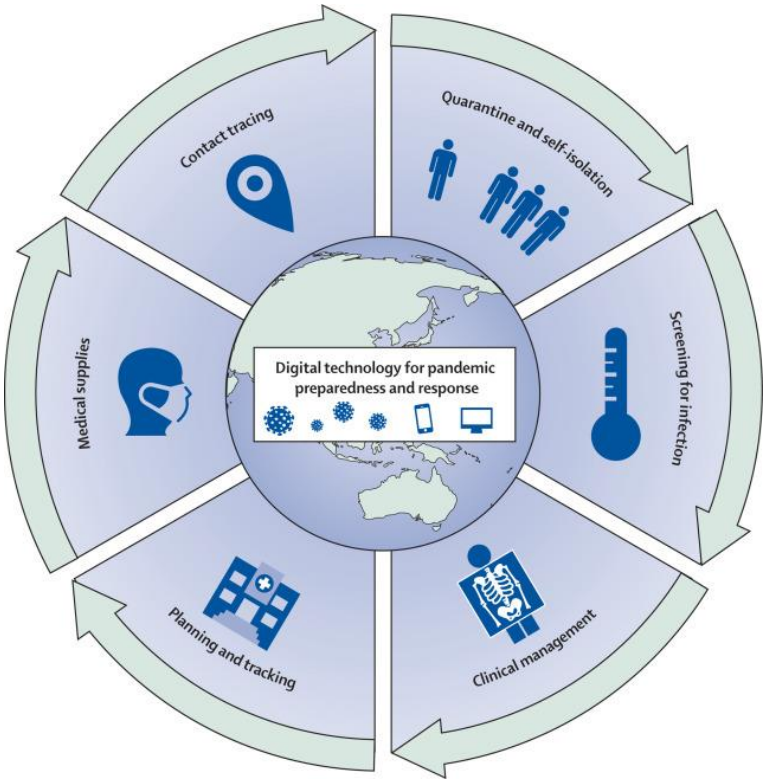
COVID-19 Pandemic had unprecedented and far-reaching impacts on mental health.

May produce mental symptoms for the following reasons,

- Direct effects caused by viral infection (Hypoxemia)
- Immune response
- Medical intervention.

Other explanations involve broader,

- ✶ Social impacts
- ✶ Psychological impacts due to social isolation,
- ✶ Unemployment
- ✶ The fear of getting infected
- ✶ Inadequate psychological support
- ✶ Racial discrimination
- ✶ Psychological burden caused by fear of infecting others



Data security

AI needs to store a large amount of medical data to analyze,

- Patients' private medical information
- The medical history of present disease
- Genetic history
- Physical defects
- Treatment conditions
- The increasing awareness of people's privacy protection and data security
- Striving to strike a balance between the three social goals of digital technology advancement
- Patient privacy protection
- Public health maintenance

Social media like Facebook, Twitter, YouTube, Instagram, Snapchat, and WhatsApp were the primary source for spreading information and news in the COVID-19 period.

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