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J-BHI Special Issue on "AI-driven Informatics, Sensing, Imaging and Big Data Analytics for Fighting the COVID-19 Pandemic"

On March 12th 2020, the World Health Organization (WHO) announces COVID-19 (COronaVIrus Disease 2019) outbreak as a pandemic. This global pandemic is caused by a new coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was first discovered in December 2019 in China. Until December 2020, COVID-19 has infected more than 68 millions of people and the reported deaths are more than 1.5 million globally. Seniors and people with suppressed immune system or chronic diseases are at higher risk. Finally, almost 4 billion of people stay at home.

COVID-19 has become a global pandemic not only because SARS-COV-2 is new without an effective treatment, but also because it is transmissible from person to person. Among infected population, approximately 80% are asymptomatic/mild-symptomatic and continually spread the virus before self-quarantine, and 20% exhibit serious respiratory symptom requiring hospitalization. If the total number of infected people with severe symptoms goes up rapidly in a short time window, and it surpasses the capacity (i.e. beds, ventilators, care providers etc.) of healthcare systems, many COVID-19 patients will die. From February to March 2020, the COVID-19 outbreak has been rapid. Thus, all nations have to reduce the speed of spread so that healthcare system can have enough beds and ventilators to care for the severely ill COVID-19 patients concurrently. Meanwhile, the large science and technology community are asked to speed up the discovery and development in fighting against COVID-19.

Biomedical big data, advanced informatics, and artificial intelligence play an important role. For example, in translational bioinformatics, the mechanism of SARS-CoV-2 and its subtypes data need to be fully investigated for developing targeted drug, vaccine, and early screening to reduce transmission and outbreak. In sensor informatics, wearable sensor data need to be analyzed in real-time for monitoring asymptomatic and mild-symptom home-based COVID-19 patients, or for caring for patients with severe symptoms in hospital intensive care units (ICU). In imaging informatics, routine CT or X-ray imaging data need to be effectively utilized with RT-PCR to improve accuracy of COVID-19 diagnosis. In clinical informatics, multimodality data need to be integrally analyzed to assist hospital care providers in using more effective clinical workflow when caring for critically ill COVID-19 patients. In behavioral informatics, human behavior data (e.g. self-quarantine, or community-quarantine etc.) need to be analyzed for different countries to get better policy and execution routine. In mental health informatics, human mental, emotional, and physical data need to be analyzed and solutions need to be provided for people to cope with self-quarantine, and to cope with any potential agoraphobia post self-quarantine. In rehabilitation informatics, physiological data need to be analyzed to understand whether and how much patients with various degree of COVID-19 infections will get full recovery of organ (e.g. lung, heart etc.) functions post recovery. In infectious disease modeling, epidemiology models need to be used with field data to predict COVID-19 spread speed so to assist policy makers in taking proper actions. In public health informatics, outbreak data need to be analyzed for population health management and COVID-19 care resource supply chain management.

This Special Issue aims (1) to encourage the stakeholders relating to COVID-19 to share data source, data harmonization, and tools, which can speed up COVID-19 research for years to come; (2) to inspire new informatics method development for rapid testing of virus in humans; (3) to present advanced informatics solutions that utilize machine learning and artificial intelligence methods such as deep learning to analyze COVID-19 data for diagnosis, treatment, and prognosis; (4) to develop computational models and tools to track virus propagation and recurrence; and (5) to model outbreaks for policy makers for better decision making. Informatics goals include data harmonization, data quality control, multi-modality data integration, advanced analysis pipeline such as deep learning, causal inference, real-time decision making, and interpretable models.

Researchers, who are using informatics to address COVID – 19 issues are encouraged to submit high

quality data and unpublished work. The submitted manuscripts will be processed through a fast track procedure, and the time from submission to first decision will be limited to 15 days.

Topics of interest include, but are not limited to, the following:

- Collection, harmonization, sharing, and visualization of COVID – 19 related data
- AI-driven exploration of susceptibility and infection in humans
- Modeling of virus propagation, recurrence and virulence from epidemiological observations
- AI-driven medical imaging (including chest X-ray and CT) analysis for COVID-19 detection
- AI-driven histopathology analysis for COVID-19 diagnosis
- Bioinformatics for COVID-19 subtype rational drug design
- ML-based treatment evaluation and outcome prediction
- AI-based care pathways planning for comorbid patients
- Deep Learning for COVID-19 treatment, and prognosis
- Sensor informatics for monitoring COVID-19 infected patients at home or in ICU
- Informatics-driven rapid testing of the virus in humans
- In silico modeling of clinical trials in COVID-19 drug and vaccine development
- Big Data-enabled Citizen-Mediated Public Health Policy making

Guest Editors

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Key Dates

Deadline for Submission:	Continuous up to June 30th, 2022
First Reviews Due:	Fast Track Process in 2 – 3 weeks
Revised Manuscript Due:	Fast Track Process in 2 – 3 weeks after decision
Final Decision:	Fast Track Process
Publication Date:	Upon acceptance of the paper it will be published in the next monthly issue in a special session