DEVELOPMENT OF AI TECHNOLOGIES AT THE GLOBAL LEVEL FOR THE DIAGNOSIS OF COVID-19

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Introduction. The coronavirus pandemic along with increasing self-isolation and quarantine associated with it created the demand for the development of modern technologies and gadgets that previously seemed to be far from implementation. The list of examples includes, but is not limited to, delivery drone technologies for food and goods shipment, medical robots, and remote health monitoring sensors – the systems widely employed in the United States, Canada, China, and European countries.

Hence, the outcomes of the COVID-19 pandemic, as well as potential public health issues in the nearest future, created the necessity for the enhancement of the digital infrastructure, thereby, the usage and implementation of artificial intelligence in the healthcare and general response to public health issues is supposed to be a priority.

Such prevention mechanisms can potentially include the big data analysis of people's movement, the modeling of disease transmission patterns, and, generally, body and health monitoring systems.

The largest cities of the world have significantly invested in infrastructural engineering aimed and maintaining the physical systems, such as buildings, roads, communications, safe and secure against natural disasters, including hurricanes, tsunamis, tornadoes, and earthquakes. Pandemics have demonstrated, however, that these approaches are not adequate to guarantee the necessary level of coordination, safety, and access for the societies in the times of biological disasters.

Using AI against COVID. The current crisis, associated with the pandemic, created the challenge of integration and optimization of the digital infrastructure, mainly, at the core phases of the public health response, including diagnostics and treatment mechanisms.

One of the major roles of the digital infrastructure in the public health response is the prediction and modeling of disease outbreaks and transmitting. An example of the AI-powered services' role in healthcare if the Computed Tomography lung screening, as AI is employed at the rapid detection of foci of coronavirus-caused pneumonia, its volume, severity, and shape measurement, and, also, in the tracking of changes between the lung lesions. Basing on the results of AI-powered scanning, the doctors are able to make quicker tests and diagnosis, as well as set a preferable treatment, thereby increasing the pace of the patients' health assessment.

The talks on the necessity of the further development of CT quality and speed via the implementation of AI were present back in 2019 [1]. The existing research demonstrated the CT chest examination has a potential for high sensitivity detection of COVID-19 lung pathology, as the potential for AI-based diagnostics was demonstrated by several groups, indicating high detection accuracy up to 95% [2-5]

The first use of CT for COVID-19 diagnosis was accompanied by controversial data. Several studies have repeatedly highlighted a certain degree of sensitivity of the CT lung examination in the diagnosis of COVID-19 pneumonia [6-9]. The CT was commonly used in Hubei Province, China, for quick diagnosis of the coronavirus, assisting in isolating and containing the outbreak. However, the use of CT in making a diagnosis of COVID-2019 and its screening was prescribed against by several professional associations of radiologists and pulmonologists in the UK and the USA, as there was a risk of overlapping with other lung - damaging diseases, for instance, influenza, which could distort the treatment. In this study, the 93% specificity rate was assigned in the algorithm. Sub-analysis of different clinical reasons for CT scans found a smaller false-positive risk in groups receiving cancer diagnostic and follow-up screening compared to wound therapy. Remarkably, the effectiveness was present and stable in the

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group of PCR-positive influenza pneumonia patients. Hence, in the light of the difficulties associated with the differentiating COVID-19-related pneumonia from other lung diseases by CT-screening, the AI may play akey role in diagnosing, characterizing, and quantifying CT-based response. The conducted study [10] demonstrated a high sensitivity level in all cohort groups.

However, two potential issues limit CT examination usage. Firstly, the interpretation time of CT by a radiologist is prolonged due to the higher pressure and load on the healthcare system during the pandemic. And, secondly, there is a certain level of possible variation in the morphology and severity of the abnormal CT finding. In mild cases, for instance, few abnormalities on chest CT might be present.

Moreover, there is free access granted [11] to the code for machine learning employed in the high accuracy studies (approximately 95%) by Mei, X., Lee, H., Diao, K. et al. [12], which allows the usage and improvement of existing developments rather than making, testing training a machine from the beginning.

Conclusions. Hence, the engineering and implementation of the aforementioned approaches can assist in addressing both issues. Firstly, the AI algorithms can process and interpret the results of Computed Tomography immediately after the scan itself. Secondly, the algorithm demonstrated its superiority against the radiologists in identifying the coronavirus-positive pattens, highlighting the normal CT-results much earlier.

Further analysis is needed on the topic of the diagnostic capabilities of the described method in an indication of the early and late pneumonia developments in the organism, connected to the COVID-19. Thus, the need for the accelerated implementation of innovative digital infrastructure such as IoT alongside AI is at place for the world community.

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