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MACHINE LEARNING APPLICATIONS IN HEALTHCARE

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ABSTRACT

In recent years Machine Learning (ML) and Artificial Intelligence (AI) in general, has drawn significant attention with respect to their applications in several scientific fields varying from big data handling [1] to medical diagnosis [2]. The use of ML techniques is already present in everyday applications everyone uses such as personalized ads, virtual assistants, autonomous driving, etc. The breakthrough of ML methods can be traced back to the years 2005 and forward with the proposal of novel learning architectures such as deep convolutional neural networks (CNN) [3] and Deep Belief Networks (DBN) [4] while significant progress is made up to now and new methodologies are proposed such as Generative Adversarial Neural Networks (GAN) [5].

Nowadays, ML techniques are widely used in several forms of healthcare applications. For example, MRI or CT screening is already applied in several hospitals around the world, especially in tumour identification. The scope of the proposed Mini symposium is to bring together researchers from all over the world and present the current state-of-the-art of ML-based healthcare applications in several healthcare domains. The proposed Mini symposium will assist in fast spreading knowledge regarding novel approaches on ML capabilities exploitation for the benefit of the society through providing medical services of higher quality at a lower cost. The contents of the proposed Mini symposium can be summarized as follows:

- ML-based Disease Identification varying from automated diagnosis to outbreak prediction. ML methods can assist as a decision making support tool for medical personnel in being able to identify a disease even remotely or for being able to estimate the spreading rate and course of a possible virus outbreak.
- Medical Imaging Diagnosis through deep learning applications. Up to date CNNs have proven to be extremely successful in translating image data into possible or not

pathogeneses varying from pneumonia to cancer cells.

- IoT and real-time personal health monitoring. As smart devices are spreading widely, there is significant work being made in gathering and utilizing real-time biological data for health monitoring and establishing early warnings in case of sudden health problems such as heart attacks, etc.
- Optimized In Vitro Fertilization via ML. As many of the natural mechanisms that affect the outcome of IVF cycles are not yet demystified, several ML approaches are currently being proposed for improving the success rates of IVF, predicting personal success rates, etc. [6].
- Drug Discovery and Personalized Medicine with the use of AI. From protein folding prediction to personal data exploitation for personalized drug design, sophisticated AI techniques are being proposed for dealing with the above issues.
- Big Data handling in healthcare. The era of digitization of healthcare data is long past us and the geometrical increase in storage needs has pushed researchers into presenting significant work in ML-based methods for handling Big Data.

The organizers of the proposed Minisymposium are very keen on attracting some of the most well respected researchers in the above fields as the proposed exchange of knowledge and networking will lead to significant results from a scientific and humanitarian point of view.

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