## Call for Chapters

# Artificial Intelligence for Data-Driven Medical Diagnosis

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**All papers must be original and not simultaneously submitted to another book project, journal or conference. The following important dates will be considered for the submissions:**

- **Proposal Submission: 30 September 2019**
  **(1-2 page proposal explaining the work; with single or double-spaced Times New Roman 11 pt. size text)**
- **Full Paper Submission for the Accepted Proposals: 30 November 2019**
  **(details for full paper preparation will be given to the authors)**
- **First Round Review Reports: 31 January 2020**
- **Revised Full Paper Submission: 29 February 2020**

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***Chapter 1***

**Current and Future Trends on Artificial Intelligence and Medical Diagnosis**

It is certain that the field of Artificial Intelligence shapes current and past state of the medical diagnosis. In this context, it is important to have idea about what was done so far, what are most recent and cutting edge research, and what are future perspectives. A total of two chapters of the edited book include general review – evaluation of current and future trends for use of Artificial Intelligence in medical diagnosis. In detail, the chapters are associated with the following subjects:

- Compare of past and recent methods of intelligent medical diagnosis
- Recent data analysis and using trends for innovative Artificial Intelligence supported medical diagnosis
- Effects and innovative sides of Deep Learning in medical diagnosis, with recent examples
- Future ideas about how future intelligent systems will deal with medical diagnosis issues

***Chapter 2***

**Pre-Analyzes for Further Medical Processes**

This chapter of the book includes research regarding pre-use of Artificial Intelligence solutions for better medical processes in next stages. In some cases, it is very critical to apply appropriate solutions for figuring out how the medical data can be explained for accurate – true medical diagnosis. That is done generally by medical staff and also by using some specific devices. Research works within this part consist of data-driven analyzes and evaluation for better understanding the input data leading to a medical diagnosis within the further works. In detail, this chapter includes the following subjects:

- Feature extraction processes with Artificial Intelligence techniques
- Novel clustering solutions for better filtering of medical data
- Hybrid computational intelligence for improving medical diagnosis performances of Machine / Deep Learning techniques
- Data gathering methods by Artificial Intelligence techniques
- Optimizing pre data analyze and data extraction process with intelligent optimization (Swarm Intelligence) algorithms



***Chapter 3*** / ***Chapter 4***

**Diagnose of Cancer and Rare Diseases**

Rare diseases such as cancer are vital health problems for today's world. Early diagnosis of such diseases has a critical importance for treatments. Nowadays, there is a great interest in the fields of biomedical and Artificial Intelligence to develop effective enough solutions for good diagnosis of cancer types and other rare diseases, which are generally also terminal diseases. So, that chapter of the book employs recent Artificial Intelligence based solutions for diagnosing rare diseases. In detail, the chapter is associated with the following subjects:

- Machine / Deep Learning for cancer diagnosis
- Optimized results by intelligent optimization (Swarm Intelligence) algorithms for past diagnosis findings of rare diseases
- Novel Artificial Intelligence based diagnosis approaches for terminal diseases
- Innovative results for diagnosing rare diseases, which have been examined for a remarkable time period

***Chapter 5*** / ***Chapter 6***

**Signal Processing and Intelligent Medical Diagnosis**

Some medical data such as EEG, ECG, or EMG are in the form of signal, which can be analyzed as time series. Generally, such time series are in chaotic forms or with noises so it is important to use some additional tasks for making them easier to understand. Analyzes over such data allows predictions in the context of medical diagnosis. So, a total of three chapters of the edited book will include research works including signals / time series as the data for diagnosis. The chapters consider the following subjects:

- Processing EEG and predicting future states by Artificial Intelligence, for diagnosing brain diseases
- Processing ECG by Artificial Intelligence, for diagnosing heart diseases
- Processing EMG by Artificial Intelligence, for diagnosing health of muscles and nerve cells
- Use of intelligent optimization (Swarm Intelligence) algorithms for better analyze of medical time series
- Use of hybrid intelligent systems for novel medical diagnosis with medical signal processing

***Chapter 7*** / ***Chapter 8***

**Image Processing and Intelligent Medical Diagnosis**

An important type of data processing widely used by Artificial Intelligence in real world cases, is image processing. Because of image-type medical data, image processing is also an important solution step for Artificial Intelligence for medical diagnosis. Currently, especially diseases needing to be analyzed over medical images taken via i.e. MR or Radiography need accurate analyze and diagnosis with Artificial Intelligence (i.e. Deep Learning). So, this chapter of the book is dedicated to intelligent medical diagnosis solutions supported with especially image processing. The chapter subjects are as follows:

- Improving known medical imaging methods with Artificial Intelligence
- Analyze of MRI images with image processing-Artificial Intelligence combination
- Analyze of radiography images with image processing-Artificial Intelligence combination
- Research on analyzing other medical imaging techniques such as Ultrasound, Photoacoustic Imaging, Tomography, Echocardiography…etc. with image processing-Artificial Intelligence combination

***Chapter 9***

**Hybrid Solutions for Intelligent Medical Diagnosis**

An important research trend in today's intelligent medical diagnosis is use of hybrid systems formed by more than one Artificial Intelligence techniques (i.e. Artificial Neural Networks trained by Swarm Intelligence) or combination of Artificial Intelligence techniques with traditional solutions. It is important to run hybrid solutions sometimes to i.e. improve performance of Machine – Deep Learning systems. That chapter includes such research works for medical diagnosis. In detail, the chapter is associated with the following subjects:

- Modeling hybrid intelligent systems for improving medical diagnosis
- Hybrid intelligent systems for diagnosing specific diseases
- Intelligent optimization (Swarm Intelligence) and Machine / Deep Learning combination for improved medical diagnosis
- Combination of traditional, data mining, and Machine / Deep Learning techniques for advanced medical diagnosis
- Improving Machine / Deep Learning performance with alternative mathematical and data analytics oriented additions

***Chapter 10***

**Hybrid Data for Intelligent Medical Diagnosis**

For more accurate medical diagnosis, it is also important to combine use of different medical data type. At this point, understanding such complex data may require use of different techniques. This chapter of the book includes research works using hybrid data and focusing on alternative solutions to deal with them, for effective medical diagnosis at the end. Essential subjects associated with the chapter are as follows:

- Combination of different medical data to improve Machine / Deep Learning based diagnosis
- Use of alternative data from patients to improve findings from Artificial Intelligence, for known disease data sets
- Analyzing use of alternative combinations of medical data for better diagnosis by Artificial Intelligence

***Chapter 11*** / ***Chapter 12***

**Medical Robotics, IoHT and Physical Devices**

Physical medical devices used for diagnosis, rehabilitation and physical treatment are very important for effective diagnosis and fast recovery. Development of such devices and also accurate optimization of them are important aspects for gaining maximum benefit for both medical staff and patients. So, Artificial Intelligence is often used in them for more innovative solutions. Nowadays, also new medical devices can be built thanks to Artificial Intelligence. In this context, Internet of Healthcare Things (IoHT) is one of the most innovative solutions with apply of network of intelligent devices for medical purposes. A total of three chapters of the edited book will gather research works focusing on development of such devices considering especially data-driven background for diagnosis and rehabilitation-treatment. The subjects of the chapters are as follows:

- Research of developing data-driven medical robotics
- Improving known physical devices with use of Artificial Intelligence techniques
- Personal treatment and rehabilitation with medical robotics
- Internet of Healthcare Things (IoHT) for novel medical treatment solutions

***Chapter 13*** / ***Chapter 14***

**Deep Learning for Medical Diagnosis**

It is clear that Deep Learning has improved the state of art regarding Artificial Intelligence and medical. In detail, there are different types of advanced neural network, which can deal with advanced diagnosis problems of medical. In this context, it is important that Deep Learning has been providing great results in terms of medical diagnosis, even in case of bigger amount of medical data. That chapter will include research works including use of Deep Learning techniques for alternative and advanced, novel findings regarding medical diagnosis. In detail, this chapter includes the following subjects:

- Convolutional Neural Networks (CNN) for especially medical imaging oriented diagnosis
- Autoencoder for medical diagnosis
- Long Short Term Memory (LSTM) for medical diagnosis
- Generative Adversarial Networks for medical diagnosis
- Capsule Network or other very recent Deep Learning techniques for medical diagnosis
- Use of hybrid Deep Learning solutions for medical diagnosis

***Chapter 15***

**Intelligent Optimization / Swarm Intelligence for Medical Diagnosis**

Intelligent optimization techniques-algorithms have an effective role on improving results of many different research works. Listed under the title of Swarm Intelligence (SI), almost all kinds of intelligent optimization algorithms have already been providing good results for improving ongoing research. Moving from that, this chapter focuses more on roles of intelligent optimization for better understanding the current state for recent findings regarding medical diagnosis. Essential subjects of this chapter are as follows:

- Swarm Intelligence for supporting Machine / Deep Learning systems of medical diagnosis
- Hybrid Swarm Intelligence for improved medical diagnosis performance
- Using Swarm Intelligence for improving traditional methods supporting medical data analysis
- Continuous or combinatorial optimization (with single, multi-objective, constained…etc.) for better medical diagnosis