MEDICAL IMAGE ANALYSIS USING DEEP LEARNING

623.714 Selected Topics in Distributed Multimedia Systems
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Medical image analysis is an active and vibrant research area, which has become more relevant during the past two decades, thanks to developments and advances in multidimensional medical imaging modalities, such as X-ray computer tomography (X-ray CT), ultrasound, positron emission tomography (PET), magnetic resonance imaging (MRI) and functional MRI (fMRI), among others. The development of more advanced imaging instrumentation triggered comparable scientific advances in the field of computer-based medical image processing, for tasks such as image reconstruction, image processing, and image analysis techniques that can lead to better understanding and interpretation of medical images.

In parallel with the advances in medical imaging, the field of artificial intelligence (AI) – particularly machine learning – has also experienced significant growth during the past 20 years, and many intelligent systems for medical diagnosis have been developed both in industry and academia. More recently, the emergence of a machine learning paradigm known as deep learning has further energized the field and enabled the development of medical image analysis systems that can display remarkable accuracy and assist in the medical diagnosis process.

Combined, these developments have resulted in an unparalleled and unprecedented state of affairs, where many challenging research problems are being solved and new market opportunities have started to emerge.

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The objective of this course is to provide an extensive overview of the field of medical image analysis, with emphasis on the use of deep learning techniques on the design and implementation of intelligent medical imaging-based diagnosis systems.

At the end of this course, participants should be able to:

- Understand the fundamentals of medical image analysis techniques.
- Appreciate the challenges involved in designing medical image analysis systems using machine learning techniques.
- Assess the impact of deep learning networks, algorithms, techniques, and frameworks in the field of medical image analysis.
- Identify directions for potential research in this field

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