Chapter 43
Demystification of Deep Learning-Driven Medical Image Processing and Its Impact on Future Biomedical Applications

R. Udendhran
https://orcid.org/0000-0002-4044-0663
Department of Computer Science and Engineering, Bharathidasan University, India

Balamurugan M.
Department of Computer Science and Engineering, Bharathidasan University, India

ABSTRACT

The recent growth of big data has ushered in a new era of deep learning algorithms in every sphere of technological advance, including medicine, as well as in medical imaging, particularly radiology. However, the recent achievements of deep learning, in particular biomedical applications, have, to some extent, masked decades-long developments in computational technology for medical image analysis. The methods of multi-modality medical imaging have been implemented in clinical as well as research studies. Due to the reason that multi-modal image analysis and deep learning algorithms have seen fast development and provide certain benefits to biomedical applications, this chapter presents the importance of deep learning-driven medical imaging applications, future advancements, and techniques to enhance biomedical applications by employing deep learning.

INTRODUCTION

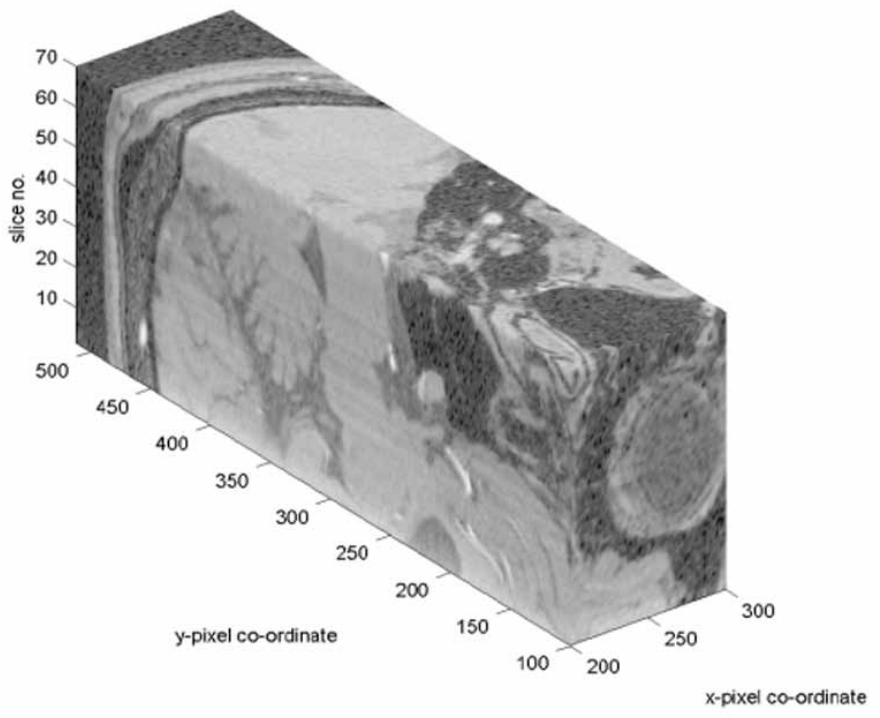
Researchers calm that deep learning, Quantum Computing and Internet of Things will revolutionize the world similar the way electricity did a century ago. This chapter presents the important opportunities as well as challenges experienced in medical image applications. Generally, biomedical imaging and

DOI: 10.4018/978-1-6684-7544-7.ch043

healthcare industry works under the rule of doctor-patient confidentiality, however, this becomes a challenge for biomedical industry with the integration of deep Learning, for instance:

- Will the data be safe after entering into the system.
- What will happen to the patients' profile and data?
- What factors contributes to the accountability and integrity of automated decision making of deep learning driven image interpretation and the machines utilization of data?

Figure 1. An example of Multi-modality for 3-D image of the brain which presents multi-information



Information about the same patient will be generated and entered into the database through various tools in own proprietary data formats are employed. In this case, if any flawed user input are entered and imperfect database design leads to data inconsistency and redundancy (Würfl et al (2018)).

In order to preclude data redundancy, inconsistency problems and less expenditure to create effective database structures before they are deployed. But in some cases, database which does not have effective data structures that can suffer from these problems, a process of database normalization should be implemented. The purpose of database normalization is to re-modify tables such a way that the relations among them are logical, so that database is scalable without any anomalies and avoid data redundancy, inconsistency problems and less expenditure. It is recommendable to design the database in the OLTP format which are highly normalized which avoids data duplication errors. In such cases, healthcare server and computers can employ Linux operating system which is a powerful multi-user operating system which allows several users to access it simultaneously. Linux precludes any changes when employed in