

RESEARCH PROPOSAL FOR THE GRADUATE STUDY AT THE SUNY, KOREA

Expected Academic Supervisor: Professor Klaus Mueller

Introduction

Researches on Medical Imaging is been proved as a worthwhile effort of the scientists around the world. It can be considered as the key which merged detection of the disease and implication of proper medication in the same line of accuracy. At present, diagnosis of a health problem is unthinkable without the proper analysis of the medical imaging. With the advancement of image technology, medical imaging has opened the myriad of success in visualizing and analyzing complex health problems and raised new hopes for us to survive without a doubt. Since medical conditions of people varies from person to person, therefore medical images of different application seems to vary very frequently. However, regardless of the complexities in the development procedures in different medical imaging applications, the improvement in the quality of the acquired image and deduction of correct quantitative information from it, has become a global aspiration. Subsequently, computer vision, pattern recognition technologies paved the way to perceive medical images in a highly reliable context and is becoming a widespread tool with the purpose of making a medical diagnosis of a patient. Considering the present aspect of medical imaging technology, I would like to do an extensive research on medical imaging technology and aim to design algorithms for medical image processing. My research focus will also include Image Fusion and Mathematical Modeling of different medical imaging techniques.

Topic area

The research will broadly focus on the development of present image processing, computer vision and pattern recognition techniques. The ubiquitous use of MATLAB facilitated us to deploy several techniques of mathematical modeling of imaging and made us able to produce 3D images for the physicians. It is widely accepted as an interactive environment for data analysis and mathematical computing to work in the sector of signal processing, optimization etc. It provides very useful tools for image processing such as threshold, correlation, Fourier Series and Transform analysis, noise reduction using filtering, basic probability and statistical functions, 2D-3D curve plotting, matrix analysis etc. It also enabled us to perform image enhancement, image transforms, colormap manipulation, color space conversion, region-of-interest processing and other geometric operations [1]. For these advantages, I will consider MATLAB as the primary tool in image processing for the simulation and graphical representation purpose of my research.

Research Question

I have done some primary research on Medical Image processing after my graduation. I have come to a research question – “ What problems hinder image processing in the Compressive Sensing Domain [2-3] and how to resolve these problems?” I would like to propose a MATLAB simulation based model for the improvement of present image fusion method which can be widely used in medical imaging technology.

Background and study plan

I have studied the basics of image processing and built several MATLAB simulations during the last summer of my undergraduate study. Through the course Digital Signal Processing, I have gained primary knowledge of Digital Signal Processing using MATLAB which I consider my first step to conduct further research on Image Processing. Before starting further research on the proposed topic, I have a plan to develop more essential knowledges on Image Processing by taking courses like Advanced Digital Signal Processing, Digital image processing, Computer vision and machine learning, Artificial Intelligence. After taking the courses, I would start working on the proposed topic under supervision of my academic supervisor.

References

- [1] MathWorks Inc. (2009) *MATLAB User's Guide*. The MathWorks Inc., United States of America.
- [2] Wan, Tao, and Zengchang Qin. "An Application of Compressive Sensing for Image Fusion." *International Journal of Computer Mathematics* 88.18 (2011): 3915-930. Print.
- [3] The Online Resource for Research in Image Fusion, available at <http://www.imagefusion.org/>.