Information Extraction from Uterine Cervical Images

Progress

1. Introduction

According to report of International Agency for Research on Cancer of World Health Organization uterine cervical cancer is the third most common cancer among women worldwide as of 2008 [1]. If early detection is available, its death rate can be dramatically reduced by appropriate treatment. This project aims increasing image quality for diagnosing cancer easily and extracting as much information as possible from uterine cervical images. Various image analysis and machine learning techniques will be studied and implemented.

2. Literature Survey

A limited number of studies in very preliminary stages, address the task of automated cervical image analysis. However they generally lack of detailed approach and make many assumptions like perfect input images. For example many of the researched studies does not consider glare removal. However, glare in the imagery presents major problems for automated image analysis
.
Proposed solution[2] in that study offers a detailed approach for information extraction from uterine cervical images. The detection of cervical region of interest is fully automatic and parameter free.

3. Methodology

3.1 Development Methodology

Agile Software Development methodology is being used for study. Agile is an iterative process and allows instant requirement changes within development period. It is a very suitable methodology for unclear projects.

3.2 Technologies

Java 1.6 technology is being used. Main JDK libraries include many image processing functionalities. For further necessities ImageJ is selected to be used. ImageJ API has better documented than other rivals like JMagick (ImageMagick).

WEKA is going to be used for contamination detection part. WEKA is a famous open source library which was developed by Machine Learning Group of University Of Waikato.

3.3 System Design

A cross-platform Java desktop application will be presented at the end of the project. Application have a clean and user friendly design. It takes an input image file in formats of JPG, GIF or PNG. After processing of input image, an output image can be saved for further use.

Figure1 shows a general view of application.

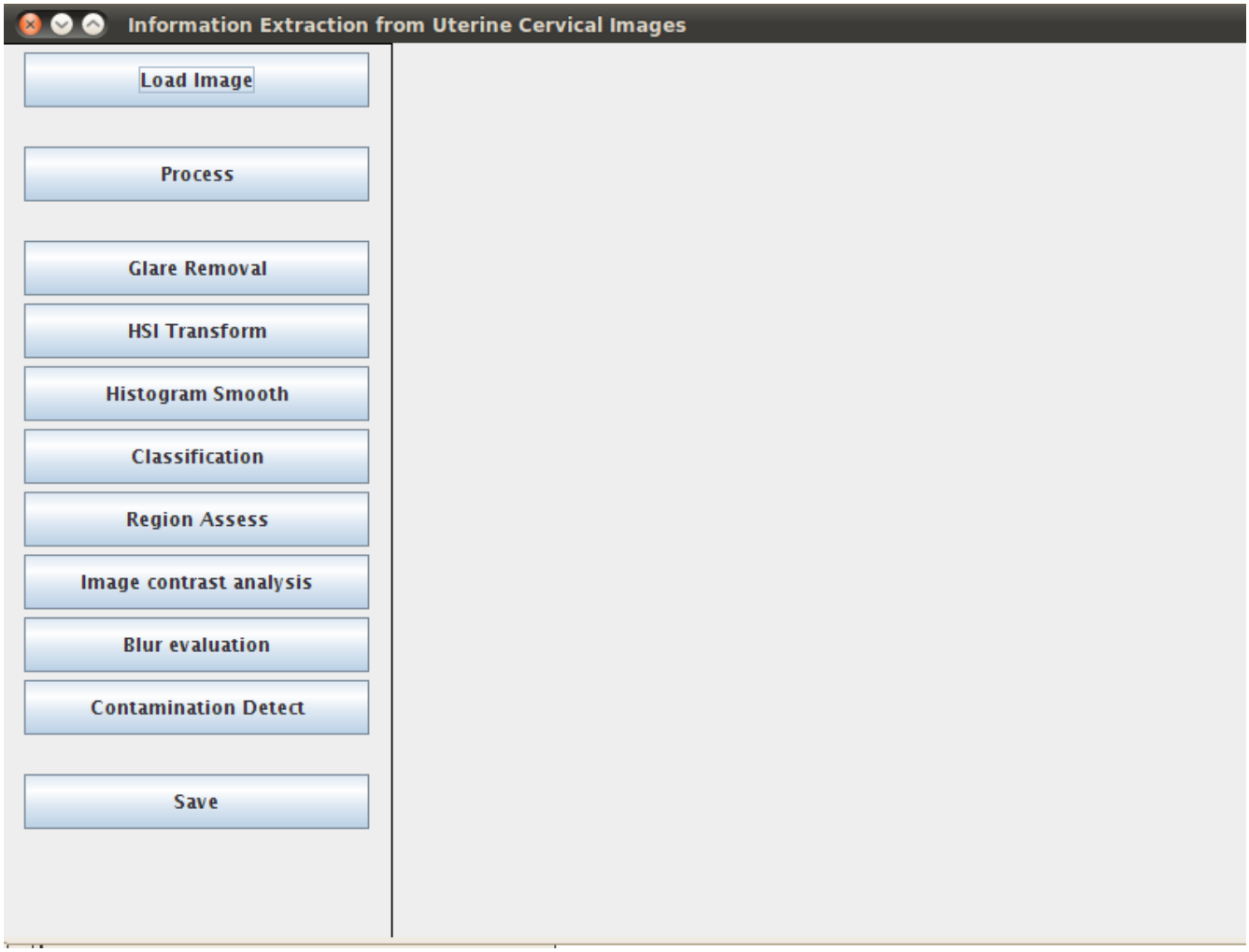

Figure1: A view of application GUI

Application consists of 3 main components. Main component is the one executed when project executables are run. Main component generates a GUI component. GUI component creates an "Operation Definitions" component. Any user action on GUI component triggers related job in "Operation Definitions" component. Operation Definitions have access to image object seen on GUI component.

Figure2 shows components of the application.

Figure2: System Components

3.4 Project Phases and Accomplished Work

After input image is given, processing of loaded image consists of 8 phases below:

- Glare Removal
- HSI transform
- Histogram Smooth
- Classification
- Region assess
- Image contrast analysis
- Image blur evaluation
- Contamination detection

Image Loading, Glare Removal, HSI Transform ,Histogram Smoothing were acccomplished. Furhter study showed that glare removal is a huge job to be done among others. It consists of feature extraction, region detection, region extension and region removal parts [3].
Glare removal caused a delay on time plan of study. Necessary work before contamination detection and further analysis supposed to be done up to now.

REFERENCES

[1] http://globocan.iarc.fr/summary_table_pop.asp?selection=221900&title=World&age_from=1&age_to=10&sex=2&type=0&window=1&sort=0&submit=%A0Execute%A0

[2] Jia Gu, Wenjing Li; Automatic Image Quality Assessment for Uterine Cervical Imagery; SPIE Medical Imaging 2006; SPIE Proc.

[3] Lange H.; Automatic glare removal in reflectance imagery of the uterine cervix; SPIE Medical Imaging 2005; SPIE Proc. 5747, 2005