Automated Cervical Cancer Screening Project

Background: Early cervical cancer screening and diagnoses has been shown to significantly decrease incidence and mortality of cervical cancer in high income countries. WHO guidelines for cervical cancer screening in low resource settings outline a see-and-treat approach which involves visual inspection of the cervix after application of acetic acid (VIA) or lugol's Iodine (VILI). Some obstacles to this approach in low resource settings include lack of early screening tools, missed diagnoses and over-treatment due to lack of technology. Most health clinics in low resource settings perform visual inspection of the cervix with the naked eye which requires the presence of trained health workers and leads to high rates of misdiagnoses. Colposcopes which are used to capture images of the cervix after acetic acid or Lugol's Iodine application for further assessment to improve accuracy in screening are very expensive and can range from $500-$20000. The Point-of-Care Tampon (POCkeT) Colposcope is a low-cost alternative to the colposcope, enabling transvaginal colposcopy of the cervix. It addresses several issues associated with cervical cancer.

Project Goal: We seek to add automated diagnoses features to the POCkeT Colposcope to enable immediate, real time diagnosis of the images and reduce the need for trained colposcopists and enable feasibility of community health screening. We currently have our algorithm on a matlab based computer platform. To enable portability of the device we would like to transfer this to an android platform. **The goal for this project is to translate the image processing algorithm from MATLAB to Python.** The current matlab code uses features of VILI (brown stain for normal and yellow stain for abnormals) to distinguish between normal and abnormal. We divide the image into separate RGB channels and detect different features from the green and blue channels. We use a support vector machine (SVM) to classify the images. "A **Support Vector Machine** (**SVM**) is a discriminative classifier formally defined by a separating hyperplane". The SVM is trained using the identified features in labeled "training data set" to create a hyperplane to separate the data. It is then the tested on a "test data set". We plan to combine this with VIA feature detection (whitening, mosaic pattern, well defined margin) to improve accuracy.

Sample Images