Tuberculosis Diagnosis using MATLAB

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Tuberculosis Diagnosis using MATLAB

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Introduction

- Tuberculosis (TB) is an infectious disease caused by various strains of mycobacteria, usually Mycobacterium tuberculosis.

- TB is spread through the air by a person suffering from TB.

- A single patient can infect 10 or more people in a year.
TB Statistics

- In 2012, nearly 9 million people around the world were infected with tuberculosis and there were around 1.3 million deaths TB-related deaths worldwide.

- Tuberculosis is the world's second commonest cause of death from infectious disease, after HIV/AIDS.

- TB is a leading killer of people who are HIV infected.

- Of the estimated 9 million TB infected people in 2013, nearly 24% were accounted from India.
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Problem Statement

- No advanced laboratory for quicker detection
- Huge manual effort & time involved to identify the TB
- Prone to human error
- More number of TB cases on the rise
- Delayed treatment

TB
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Proposed TB Diagnosis Overview

- Sputum Sample Collection
- Staining and Slide preparation
- Digital Image Capture
- Server
  - Image Processing
  - Report Generation
  - Internet

Automatic Process
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**Image Processing Flow**

- **Input**
  - Input Microscopic Images

- **Pre-Processing**
  - To Remove Noise using Median Filter

- **Global Thresholding**
  - To Remove Tissue and background

- **TB Extraction and Detection**
  - K-means clustering approach
  - Otsu Thresholding approach
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**Tuberculosis Diagnosis - Infrastructure**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>With PCT</th>
<th>Without PCT</th>
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<tbody>
<tr>
<td>Computation Time</td>
<td>🧐</td>
<td>😞 (30-35%)</td>
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<tr>
<td>Accuracy</td>
<td>🧐</td>
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<td>Handling Large data</td>
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*PCT refers to Parallel Computing Toolbox*
Benefits

- High degree of accuracy, specificity and better speed in detecting TB bacilli
- Reduced dependency on trained profession
- Faster Diagnosis Report
- Quicker diagnosis of TB patients
- Inexpensive for use in rural/remote locations
Future Scope of Work

- Implementation of advanced techniques to identify TB
- Telepathology diagnosis for other applicable diseases, like, Malaria
- Processing Ziehl-Neelsen stained acid-fast bacilli digital images
- Interfacing with database & managing data
- Latest cryptography techniques to enable secured data communication
- Infrastructure support using Cloud
- Mobile Technology-Android \ iOS
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