Tuberculosis Diagnosis using MATLAB

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Tuberculosis Diagnosis using MATLAB

Agenda

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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
Problem Statement

- Tuberculosis Diagnosis using MATLAB

No advanced laboratory for quicker detection

- Delayed treatment

- More number of TB cases on the rise

- Prone to human error

- Huge manual effort & time involved to identify the TB
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Proposed TB Diagnosis Overview

1. Sputum Sample Collection
2. Staining and Slide preparation
3. Digital Image Capture
4. Internet
5. Server
   - Report Generation
   - Image Processing
   - 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
# Tuberculosis Diagnosis using MATLAB

## 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>😊 (30-35%)</td>
<td>😞</td>
</tr>
<tr>
<td>Accuracy</td>
<td>😊</td>
<td>😊</td>
</tr>
<tr>
<td>Handling Large data</td>
<td>😊</td>
<td>😞</td>
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*PCT refers to Parallel Computing Toolbox*
## Benefits

<table>
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<th>Benefits</th>
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<tr>
<td>High degree of accuracy, specificity and better speed in detecting TB bacilli</td>
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<tr>
<td>Reduced dependency on trained profession</td>
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<td>Faster Diagnosis Report</td>
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<td>Quicker diagnosis of TB patients</td>
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<td>Inexpensive for use in rural/remote locations</td>
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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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