

# Tracking Cough Rates of Tuberculosis Patients Over Time

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## Introduction

### Our Problem

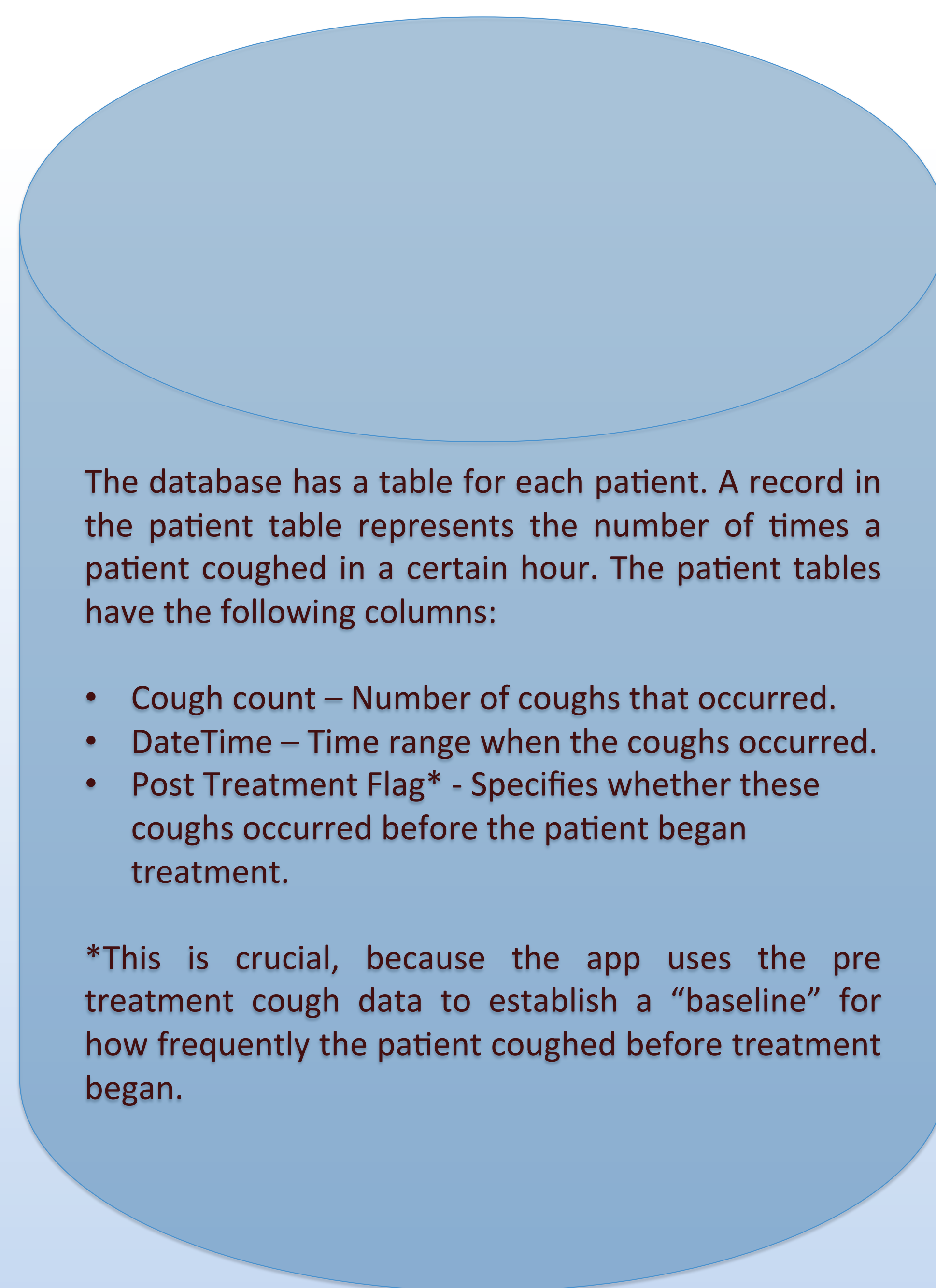
There is a very high incidence of Tuberculosis in Peru with over 30,000 cases reported in 2013 alone. Many of those who suffer from TB in Peru are unable to afford the frequent doctor visits that are generally required for complete recovery. Another issue is that patients in the recovery process tend to get discouraged if they believe their medication is not yielding immediate results. This can cause patients to stop taking their medication, and thus hinder the overall recovery process.

### Our Solution

Our goal is to find an easy way for TB patients to track their own improvement throughout the treatment process. We have done so by creating a framework that will allow patients to track their progress on their Android phone. This will keep patients informed regarding the status of their health, eliminate unnecessary and expensive trips to the doctor, and encourage them to continue with their medication.

## Backend

The server is the backbone of the entire framework and it is made up of 2 components: A database and a web API.



### Acknowledgements

Course Instructor – Chris Gregg  
Project Sponsor – Brian Tracey  
Project Lead – German Comina

### Web API

#### Uploading Cough Recordings

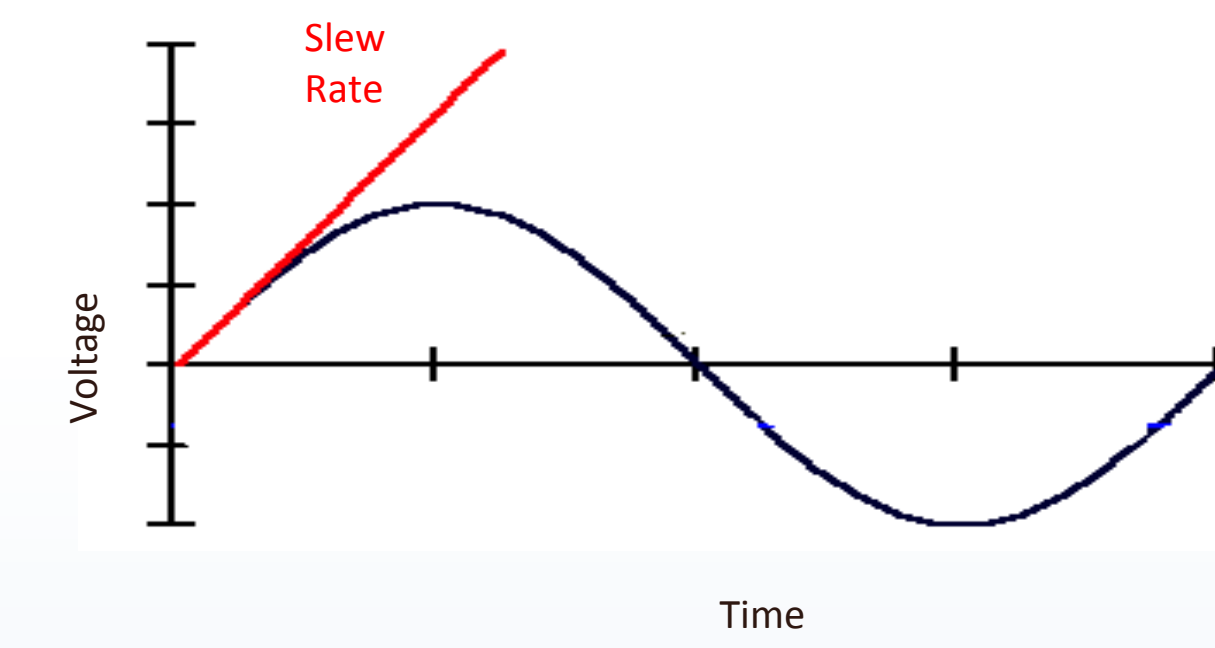
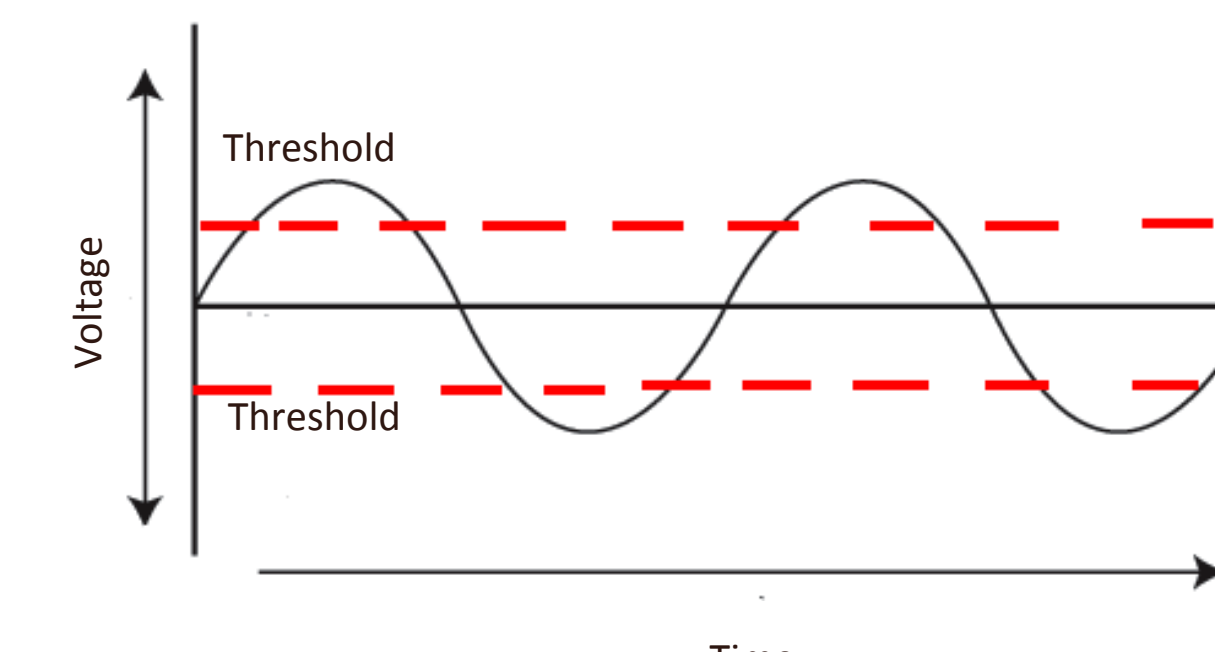
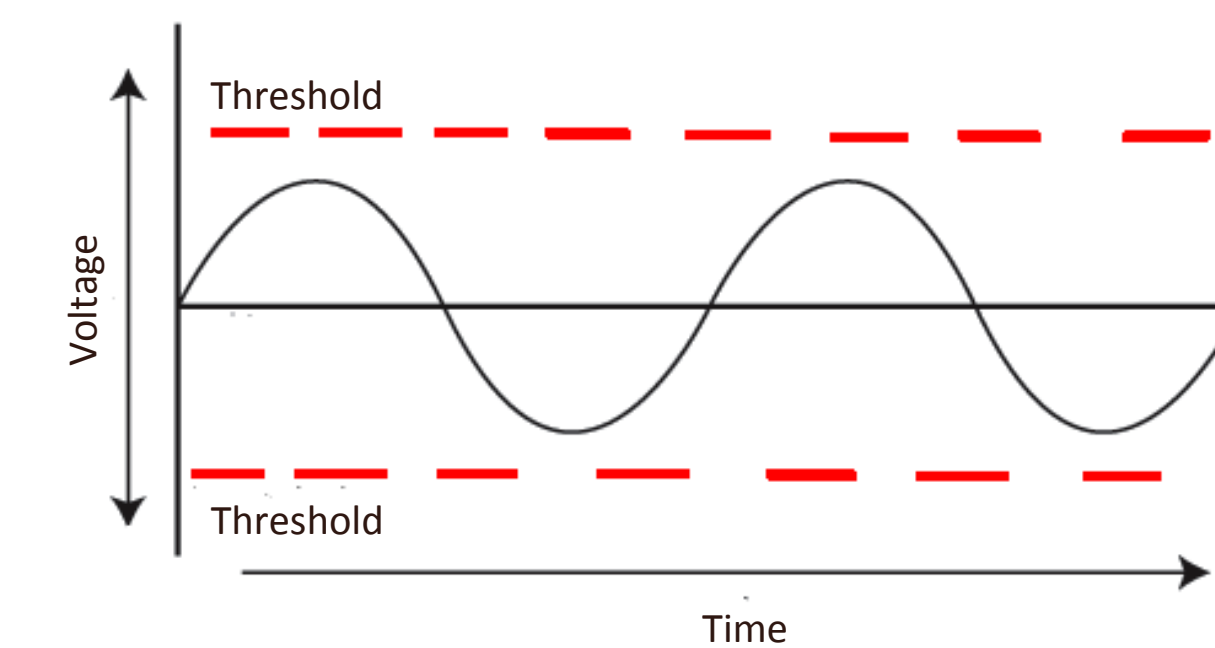
1. The patient records an hour long wave file as he/she goes about daily life.
2. The wave file is sent to the server using HTTP, with metadata describing the patient and time of recording.
3. The server runs the cough detection algorithm on this wave file, resulting in a cough count for the given hour.
4. This cough count is inserted as a new record in the patient’s table.

#### Downloading Cough Data

1. The TB Monitor app asks the server for a specific patient’s cough data during a specific time range.
2. The server sends back JSON Objects containing cough counts per hour.

## The Sanitizer

In order to test the cough detection algorithm, there is a need for clean cough data in the form of wav files. In this data collection process, it is very easy to get subpar data due to faulty recording techniques. In order to avoid wasting the time and resources necessary to collect this data, it is necessary to know immediately if the cough data collected is adequate for testing. There are three primary cases of subpar data the data sanitizer looks to extricate from the wav files.



## Frontend

The frontend lives entirely in an Android App called TB Monitor. This app allows patients to login and view graphs of their cough counts over time. They can view their trends over a day, week, month, or year. The user can press and slide along the graph to view different data points, and they can scroll through past days, weeks, and months.

When the patient logs in, the app asks the web API for cough data within a set time range. As the user navigates through different tabs and time ranges, the app checks its cache for the requested data. If it can’t find it, it asks the API for coughs from the new time range.

The patient can toggle the amount of time the graph displays via tabs.

The baseline shows the patient how frequently they coughed before they began treatment.

The patient can choose past days, weeks, and months to display on the graph.



The sync button refreshed the data in the local stores.

The graph shows the user their cough counts over time. The y-axis is number of coughs. The x-axis is a range of time.

Depending on the trend of the line, the app will advise the patient on whether or not they need to go see a doctor.

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