



DOCTURNAL PRIVATE LIMITED
'Platform for Non-Invasive, Point of Care Screening'
"Tuberculosis | Other Lung Based Ailments with Aural Components"

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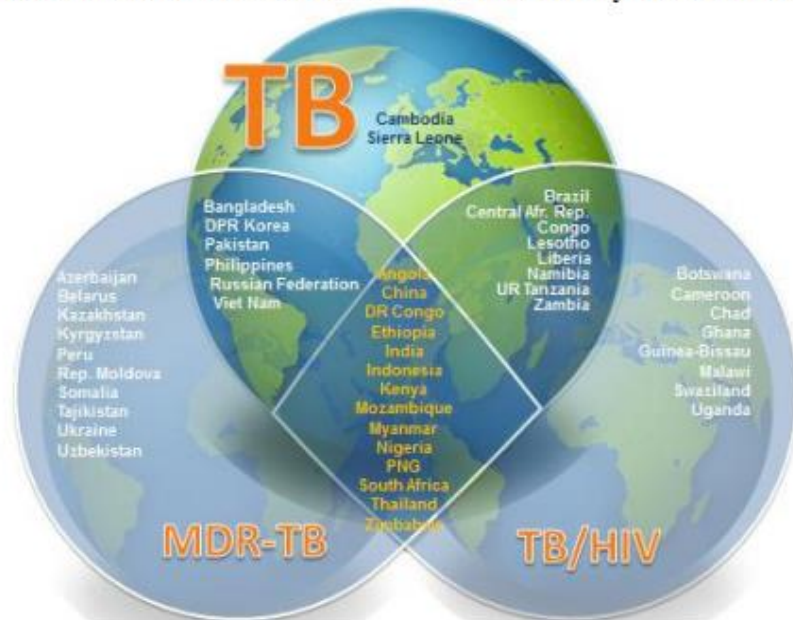
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The Problem and Current State

Country	Tuberculosis
India	3 Million
Rest of the world	11 Million

Figure 1: The three HBC lists of 30 countries each that will be used by WHO 2016–2020



The 30 TB HBCs (those in all 3 lists in bold) are: **Angola**, Bangladesh, Brazil, Cambodia, **China**, Congo, Central African Republic, DPR Korea, **DR Congo**, **Ethiopia**, **India**, **Indonesia**, **Kenya**, Lesotho, Liberia, **Mozambique**, **Myanmar**, Namibia, **Nigeria**, Pakistan, **Papua New Guinea**, Philippines, Russian Federation, Sierra Leone, **South Africa**, **Thailand**, the United Republic of Tanzania, Viet Nam, Zambia and **Zimbabwe**.

The Gap – TB

- Reactive, Cumbersome, Expensive
- Lacks Awareness, Social Stigma
- 1:11 (infection : contagiousness)
- MDR (drug resistant) TB is on the rise
- MDR comprises 1/3 of Global AMR burden

Current State

- Patented Point Of Care tool for TB screening – ‘TimBre’

Solution – Cough Based Screening (External Hardware)

Recording through a
Microphone Array



Person Coughs
and
Demographic
Clinical
Alongside .WAV
are Captured



Data Analytics -
Machine/Deep
Learning – TB &
MDR

Can be used for
Prognosis to
determine drug
Sensitivity or
Resistance



Results Referred To
a Partner
Diagnostic Lab or a
Partner Physician



Recorded
(EMR)



- **Final patent with Indian PTO in dec'17**
- **Extensible: COPD & Asthma**

Results Shared with
the Individual along
with the Next Steps

TimBre – Value Proposition

01

Works on a smartphone with microphone (hardware provided)

02

API is integration agnostic. The solution is also system, infrastructure, connectivity and geography agnostic

03

Which means it can easily be integrated with any medical facility applications. Seamlessly works for mHealth & telemedicine applications

04

Solution for mass identification of cases accessible and affordable to the last mile

Underlying Mechanism



01 SIGNAL PROCESSING

Cough Sound Data as an input variable

02 MACHINE LEARNING (SUPERVISED LEARNING)

Classification of TB - Aural & Clinical Inputs

03 SEMI-SUPERVISED MODELS

for MDR-TB

04 DEEP LEARNING

Spectrographs

05 POINT OF CARE

Ease of Use

05 NON-INVASIVE & REAL TIME

Takes 5 minutes to screen and obtain results

* Home Grown Training Database of 7000 cough samples.

Competitive Analysis

Way ahead in data collection

Robust algorithm that can now be use for COPD & Asthma

Already partnered with a big pharma with exclusive rights



	POC	Objective	Non-Invasive	Real-Time	Less Cumbersome
Sputum	✗	✓	✓	✗	✓
Culture	✗	✗	✓	✗	✓
GeneXpert	✗	✓	✓	✗	✓
Mantoux	✗	✗	✗	✗	✗
CXR (Qure.ai)	✗	✓	✗	✓	✗
Docturnal	✓	✓	✓	✓	✓

Impact and Roadmap

Infectious Nature of the disease to the ratio of 1:11
The number that remain unidentified pose a major health threat

Cost of late identification of the disease to a family, for treatment that is expensive, not accessible to all and time taking

Sputum Smear Vs TimBre Results - Real Time Operation - Minimal Human Intervention
Cost of Implementation – 1/4
Accessibility - to the last mile

Our Strategy

- 1) A binary classifier in place for PTB – Labelled Data
- 2) Other Labelled data includes Asthma, COPD, Pneumonia & Others
- 3) Extensibility for a multiclass classifier is seamless – Asthma and COPD

		2019	2020	2021
1	TimBre (TB & COPD)	PAN India		
2	TimBre (TB & COPD)		China & other HBC	
3	Yet to be Named (Asthma)			Asthma, India and other HBC

Currently running pilots in Hyderabad and a multisite double blinded clinical trial at NH

Clinical Trials & Traction so far

For Packaged Solution:

- 1) Piloted at 25 (3900 subjects screened) sites as a part of screening camps



- 2) MSMF/NH as a multisite trial

- 3) Clinical Trial Sites :

- NH (250/500 subjects completed) - **CTRI/2019/02/017672**
- TB Hospital, Bangalore – 500 subjects
- Erragadda ART – 500 subjects
- Erragadda Chest Hospital OPD – 500 Subjects

Team – 11 and growing



**Rahul
Pathri**

- Founder, COO
- Biologist
- Executive Management – IIM(K)
- Data Scientist



**Vaishnavi
Reddy**

- Co-founder, CTO
- Biomedical Engineer
- B.Sc Electrical and Electronics
- Data Scientist



**Arpita
Singh**

- Co-founder, CEO
- Digital Marketing Head
- MBA ICFAI



**Shekhar
Jha**

- CSO
- Bioinformatics Scientist
- Biotechnology Expert



**Dr. Suryakanth
Shetty**

- Ph.D IIT Madras
- Professor IIITH
- Heads Speech Lab-IIITH
- Advisory role

CORE TEAM

Advisors



**Dr. Biju
Jacob**

- Head of Healthcare Innovations & Research at Narayana Health Group of Hospitals
- Medical Geneticist
- Expert in early-stage discovery, idea to PoC, clinical testing, and validation.



**Dr. Paul
Salins**

- Chairman, CIMED
- Sr Vice President NH Narayana Health
- Medical Director Mazumdar Shaw Medical Center
- Managing Director Mazumdar Shaw Medical Foundation

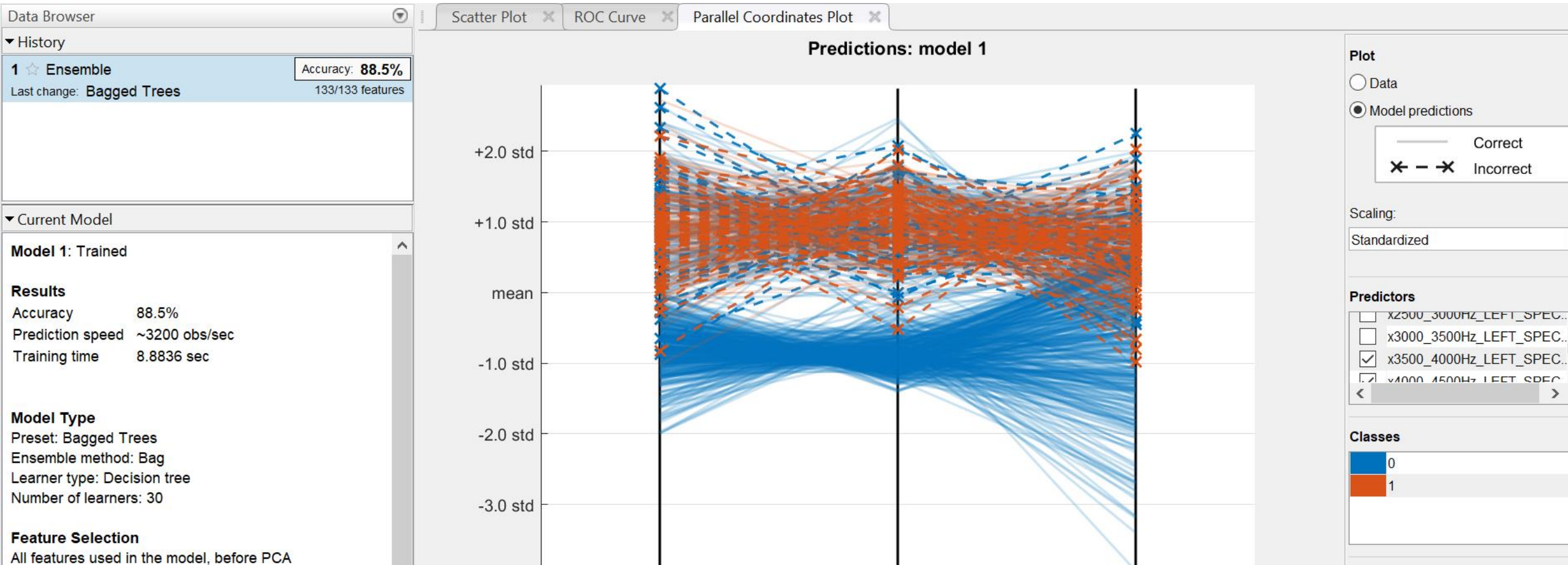


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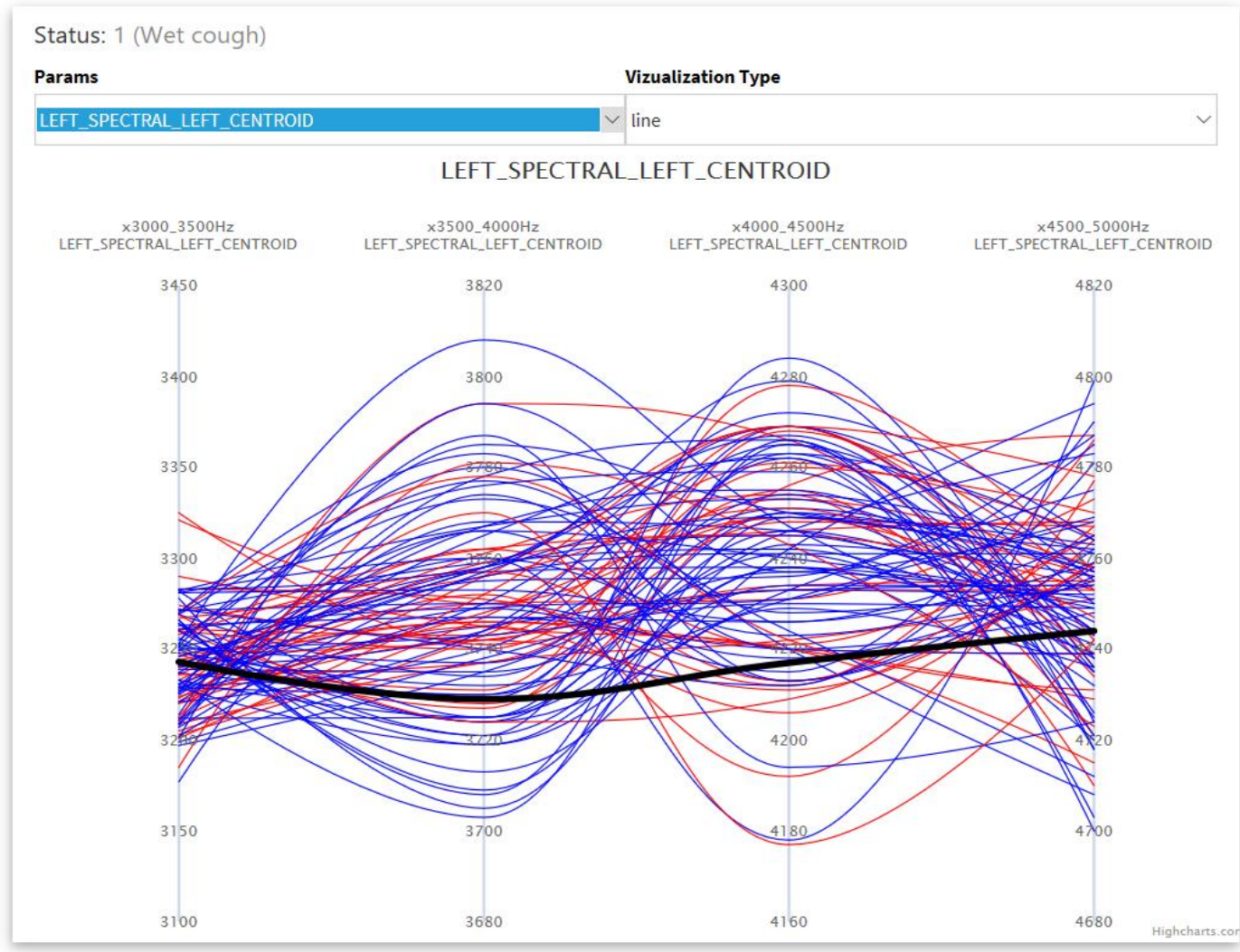
APPENDIX

XAI – Rapid Diagnostics



XAI – Rapid Diagnostics

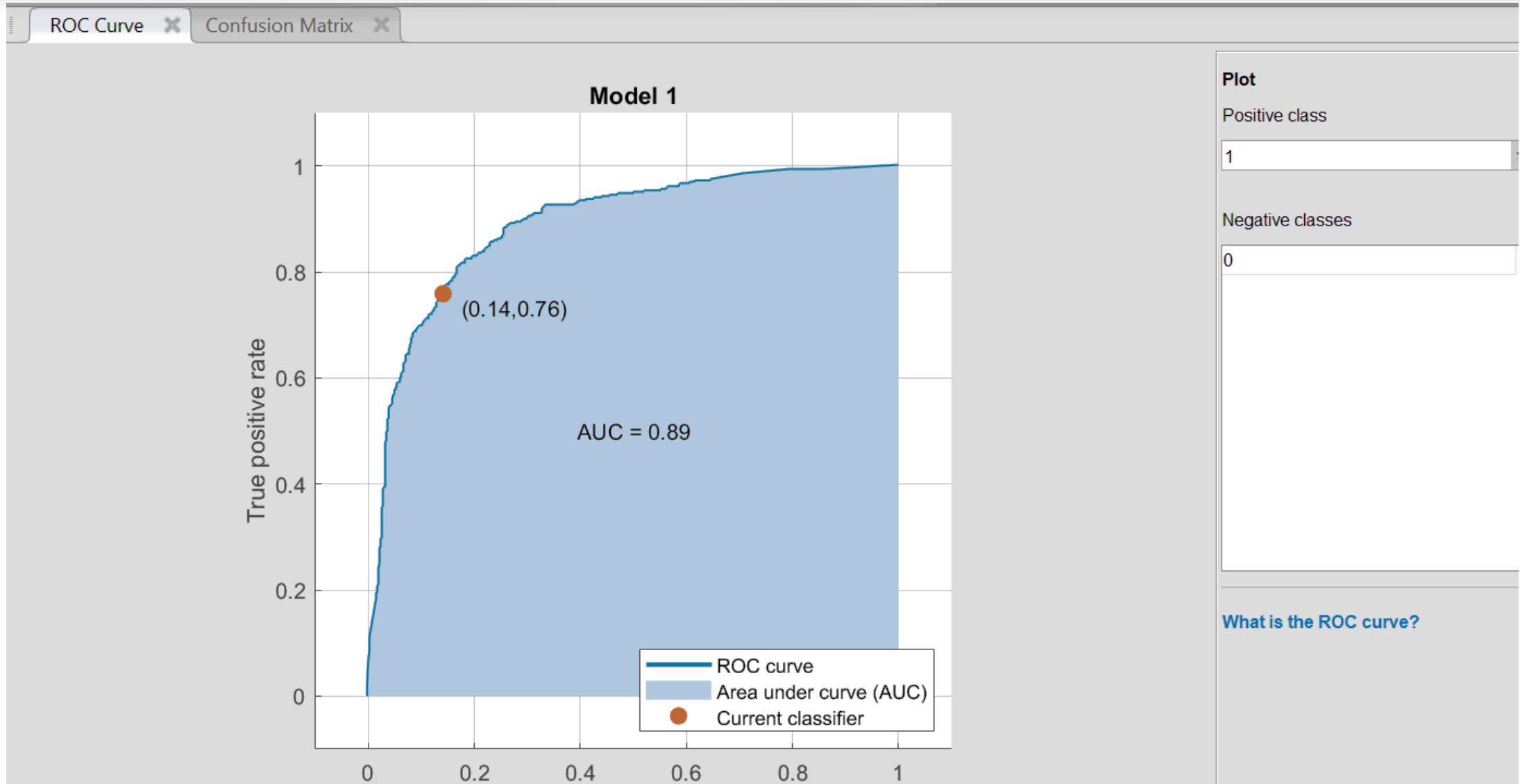
- Result
- Leads
- Download
- User
- Master Data



Patient Details

Gender	: Male
Age	: 42
BMI	: 15.82
AppetitePattern	: Irregular
Cough Type	: Irregular
Weight x Height	: 40 X 5.3
Current Medications	: Koch's On Cat2 ATT

Receiving Operating Curve – ROC (True positives and negatives)



Pricing and Pipeline

Subscription Model –
INR 100 including
consumables @ INR 10 per
screening

5000 deployments
with a large pharma
giant – Phase 1

1600 deployments for a
leading public health
organization in India



Estimated 10 Screenings/day
in a private setup and 20
screenings/day in a
government setup

5000 deployments
with a large pharma
giant – Phase 2