minoHealth AI Labs: The Potentials of Artificial Intelligence and Data Analytics In African Healthcare

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African Healthcare Problems

High Mortality Rate
- 9.2 million deaths (2015)
- 5.2 million of deaths (56.4%): lower respiratory tract infections, HIV/AIDS, diarrhoeal diseases, tuberculosis and malaria.
- 3.1 million deaths (33.5%): stroke, ischaemic heart disease and cirrhosis of the liver

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Diagnostics & Radiology

50-70% of clinical decisions depend on accurate laboratory diagnosis

Missed Diagnoses
Less than 1% of South Africans were reported to have sickle cell anaemia, but a recent study found that since 2001 the incidence had increased by more than 300%.

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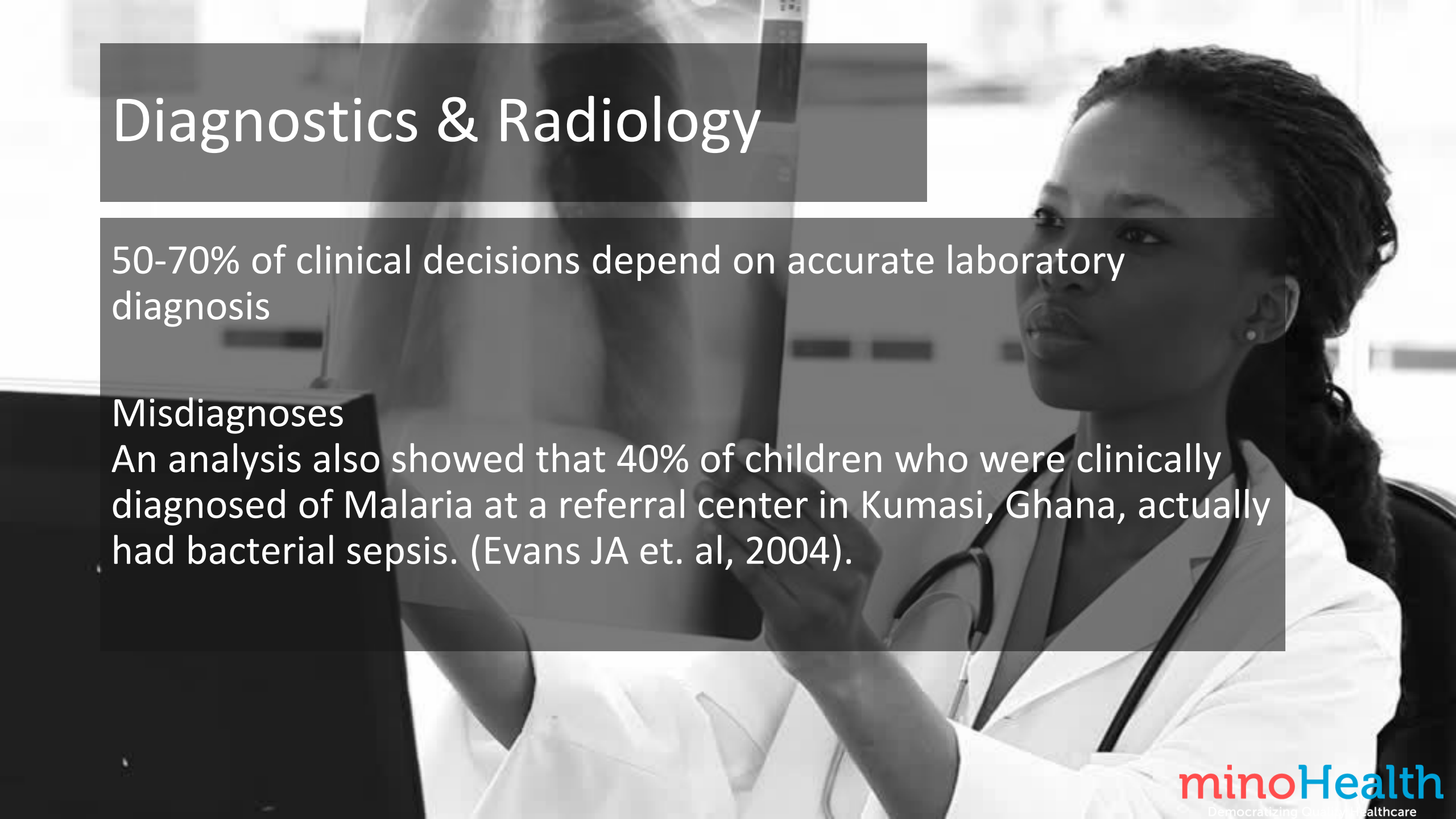
Diagnostics & Radiology

50-70% of clinical decisions depend on accurate laboratory diagnosis

Misdiagnoses
An analysis also showed that 40% of children who were clinically diagnosed of Malaria at a referral center in Kumasi, Ghana, actually had bacterial sepsis. (Evans JA et. al, 2004).



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Doctors & Medical Technologists

Lack of Adequate Healthcare Providers
- Ghana has 11,000 patients per 1 doctor ratio
- Malawi has 60,000 patients per 1 doctor ratio

-South Africa has 1.2 radiologists per 100,000 people
-Ghana has about 34 radiologists, 1 radiologist per 800,000 people

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Artificial Intelligence

Data Science

Cloud Computing

Artificial Intelligence

- AI for Medical Diagnoses, Forecasts and Prognoses
- Conditions like Breast Cancer, Diabetes, Pneumonia, Fibrosis and Hernia
- Radiology: Using mostly Medical Images (Computer Vision)
- Deep Learning, Convolutional Neural Networks

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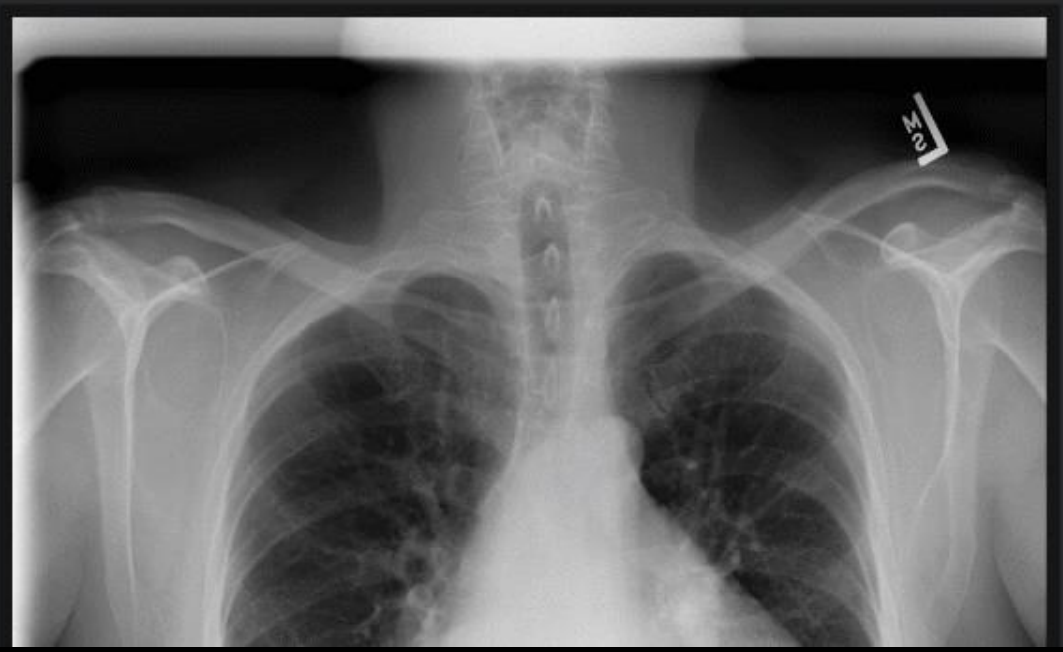
Abaddeh Taleb

Patient ID: DT1528



Pneumonia Diagnostics
Results:

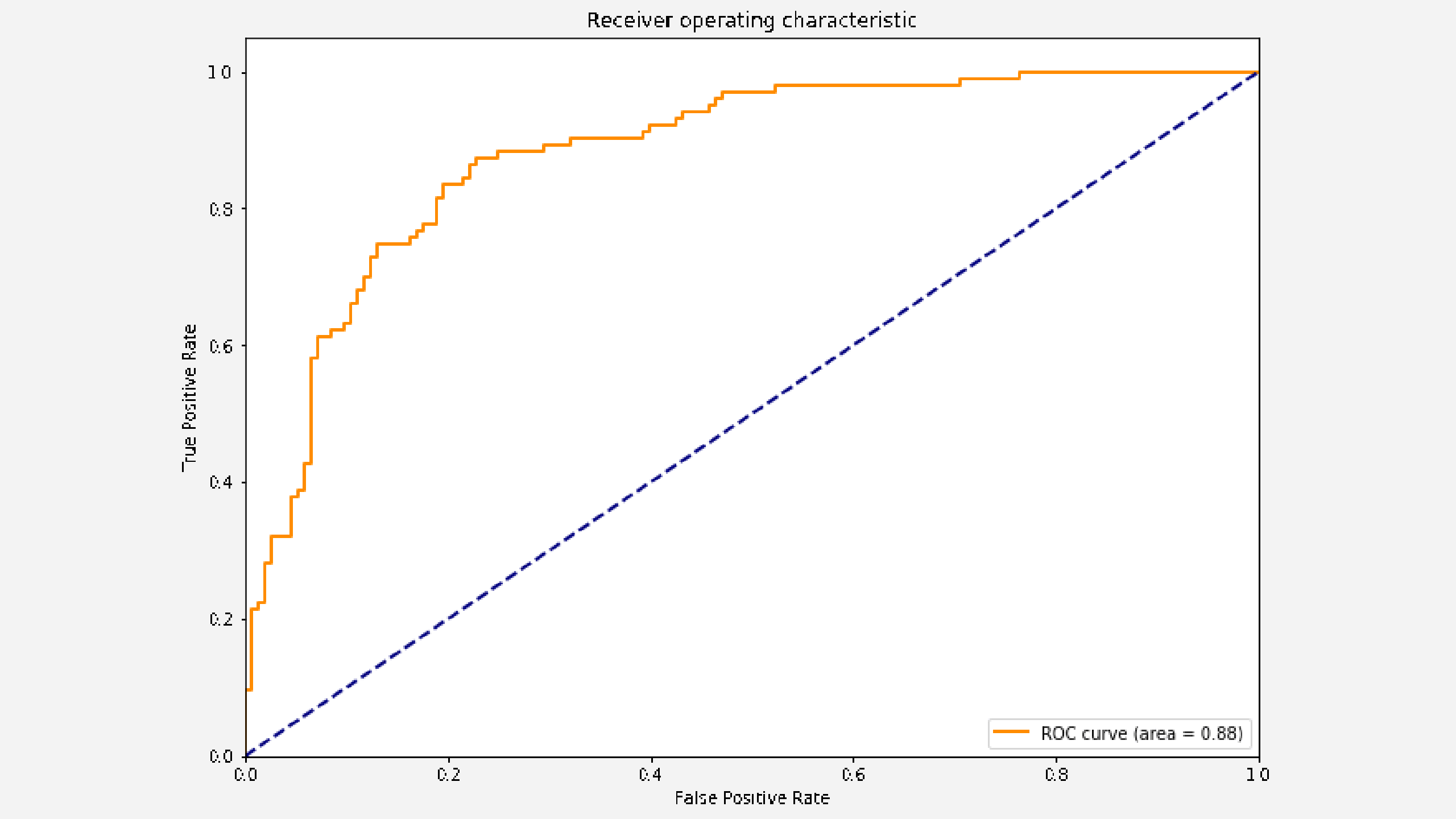
47.89%

Probability Of
Pneumonia

DZODZE HOSPITAL
Requested By

2018-05-31 10:07:04
Test Datetime

Visit Patient's Full Medical Records


Receiver operating characteristic
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
ROC curve (area = 0.88)

Data Science & Cloud Computing

-Cloud platform to store and access patient medical records

with any device connected to the web

-Auto analyse all collected data, to discover aggregated stats and then visualize them

-Visualized health stats becomes available to health ministries and other authorized health management organizations

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Summary | Medical History | Vital Signs | Test Results | Request A.I Tests

Celine Adjao

Patient ID: EED3433FFF

1995-05-07 (22 YRS)
Date Of Birth

FEMALE
Gender

02498468794
Telephone

CELINE@GMAIL.COM
Email

CANDY STREET, 9, NIMA, GREATER ACCRA REGION
Home Address

EED3433FFFJKF
OutPatient ID

EED3433FFFZE3
InPatient ID

34567654GT
NHIS ID

REQUIRE REFERRALS FOR SPECIALTY VISITS (Insurance Plan Requires Referrals For Special Visits)

GUI6THJKIUVRTH667
SSNIT

SINGLE
Marital Status

GUDRA ANALYTICS
Employer

DATA SCIENTIST
Occupation

RAMON AGLAGO (0236524286)
Emergency Contacts

DR SANDRA LAVANYO
Primary Care Provider

DR ELIKEM NYAMEKYE
Referring Physician

EPIDEMIOLOGY
Specialty

DR ELIKPLIM DJANTOH
Other Physician:

PSYCHIATRY
Specialty

Vital Signs

Respiratory Rate: 18 BPM (-)
Pulse Rate: 96 BPM (+)
Diastolic Blood Pressure: 21 mmHg (+)

Location

Medical Conditions

Medical Conditions

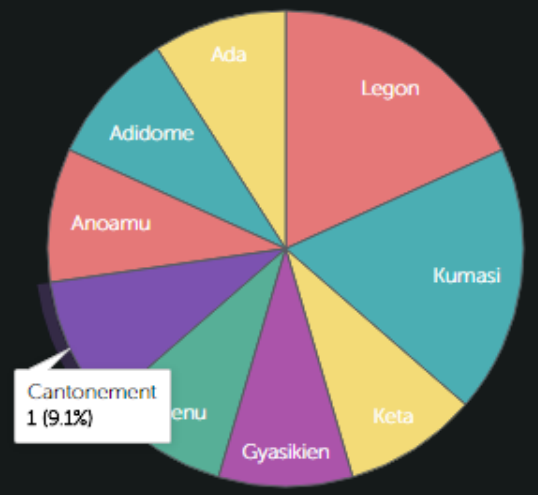
Medical Conditions / Towns

Medical Conditions / Regions

Gender

Age

Diabetes Mellitus



Population: 7.8% of patients(11 patients) have Diabetes Mellitus

Gender: 45.5% of patients(5 patients) with Diabetes Mellitus are Male, 54.5%(6 patients) are Female

Age: 9.1%(1 patients) are between the ages of 51 - 74 yrs
54.5%(6 patients) are between the ages of 31 - 50 yrs
18.2%(2 patients) are between the ages of 23 - 30 yrs

ScaffoldNet (Akogo et al., 2018)

(Future of Information and Communications Conference proceedings)

Convolutional Neural Network for classifying Airbrushed (alternatively known as Blow-spun), Electrospun and Steel Wire synthetic scaffolds used in Tissue Engineering.

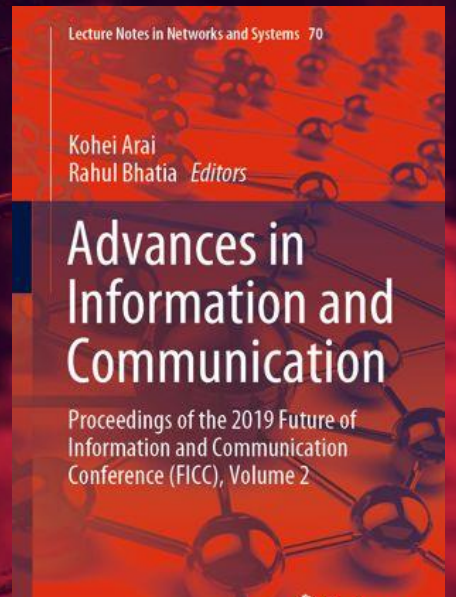
99.44% accuracy

demonstrates AI's potentials in screening complex, biological, fibrous structures seen in cortical bone and fibrous shells

global community bio summit

FICC 2019

14-15 March, San Francisco



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End-to-end learning via a convolutional neural network for cancer cell line classification (Akogo et al., 2018)

6-layer Convolutional Neural Network that classifies 2 types of human breast cancer cell lines, MDA-MB-468 and MCF7.

99% accuracy

demonstrates the potentials of end-to-end learning systems for faster and more accurate automated cell analysis.

WHU RCIUR

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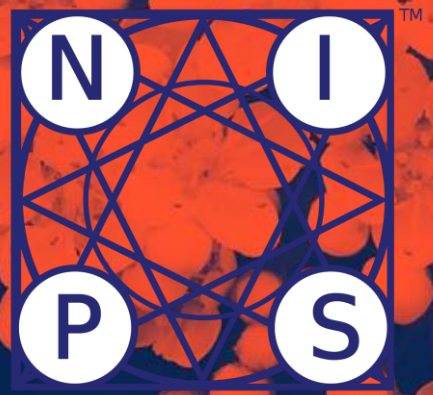
CellLineNet (Akogo et al., 2018)

31-layer Convolutional Neural Network that classifies 5 types of epithelial breast cell lines comprised of 2 human cancer lines, 2 normal immortalized lines, and 1 immortalized mouse line (MDA-MB-468, MCF7, 10A, 12A and HC11)

96.67% accuracy



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Ongoing Research

Using Machine Learning and Advanced Data Analytics to identify specific antibodies and cytokines that are responsible for Malaria Immunity (in Collaborations with Researchers from WACCBIP)

Deep Learning Protein Homology Classification, Protein Generation. Drug Discovery and Development (in Collaborations with Researchers from Old Dominion University)

Deep Learning Cell Segmentation, Detection, Measurement, Counting and Analysis (minoHealth AI LAbs and Runmila AI Institute)

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