AI in Healthcare

By Shikha Verma, Aman Kumar and Tammadwar Vaishnav

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Introduction

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Topic: AI in Healthcare

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- Motivation behind applying AI in healthcare

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- Data type analysed by AI systems

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- Mechanisms/ Algorithms used

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- Motivation behind applying AI in healthcare
- Data type analysed by AI systems
- Mechanisms/ Algorithms used
- Example of Stroke

Motivation

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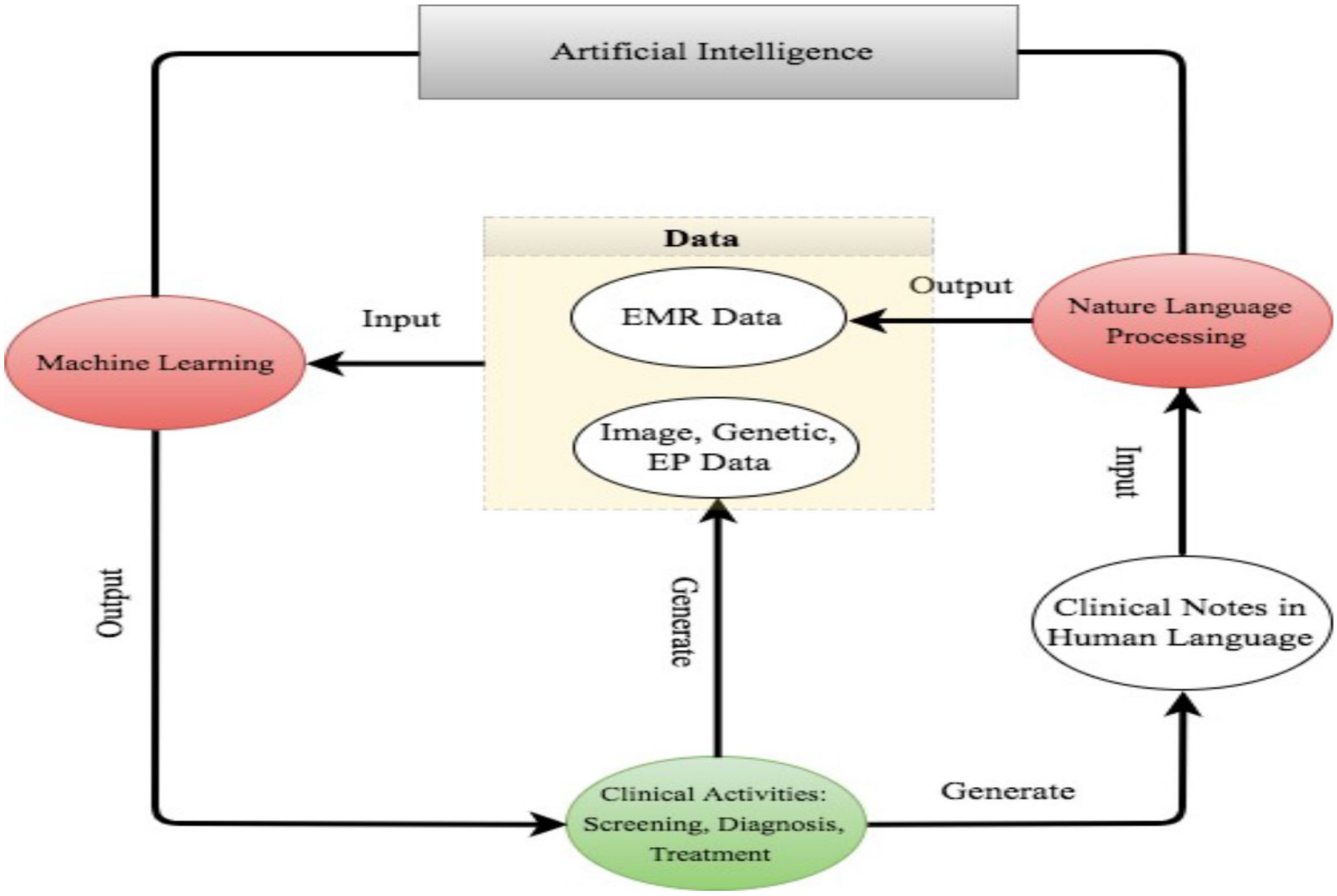
"If you have life, you have the world. "

- Cancer, neurological and cardiological disorders are leading causes of death.
- Early detection can help inhibit the growth of the disease.
- Can 'learn' features from large data.
- Can use the obtained insights to assist clinical practice


Artificial Intelligence
Data
EMR Data
Image, Genetic, EP Data
Output
Input
Machine Learning
Nature Language Processing
Input
Output
Generate
Clinical Notes in Human Language
Clinical Activities: Screening, Diagnosis, Treatment
Generate

Data type analysed by AI systems

Data type analysed by AI systems

- Machine understandable
- Raw data

Data type analysed by AI systems

Data type analysed by AI systems

Machine understandable :

Data type analysed by AI systems

Machine understandable :

Image

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Image

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Machine understandable :

Data type analysed by AI systems

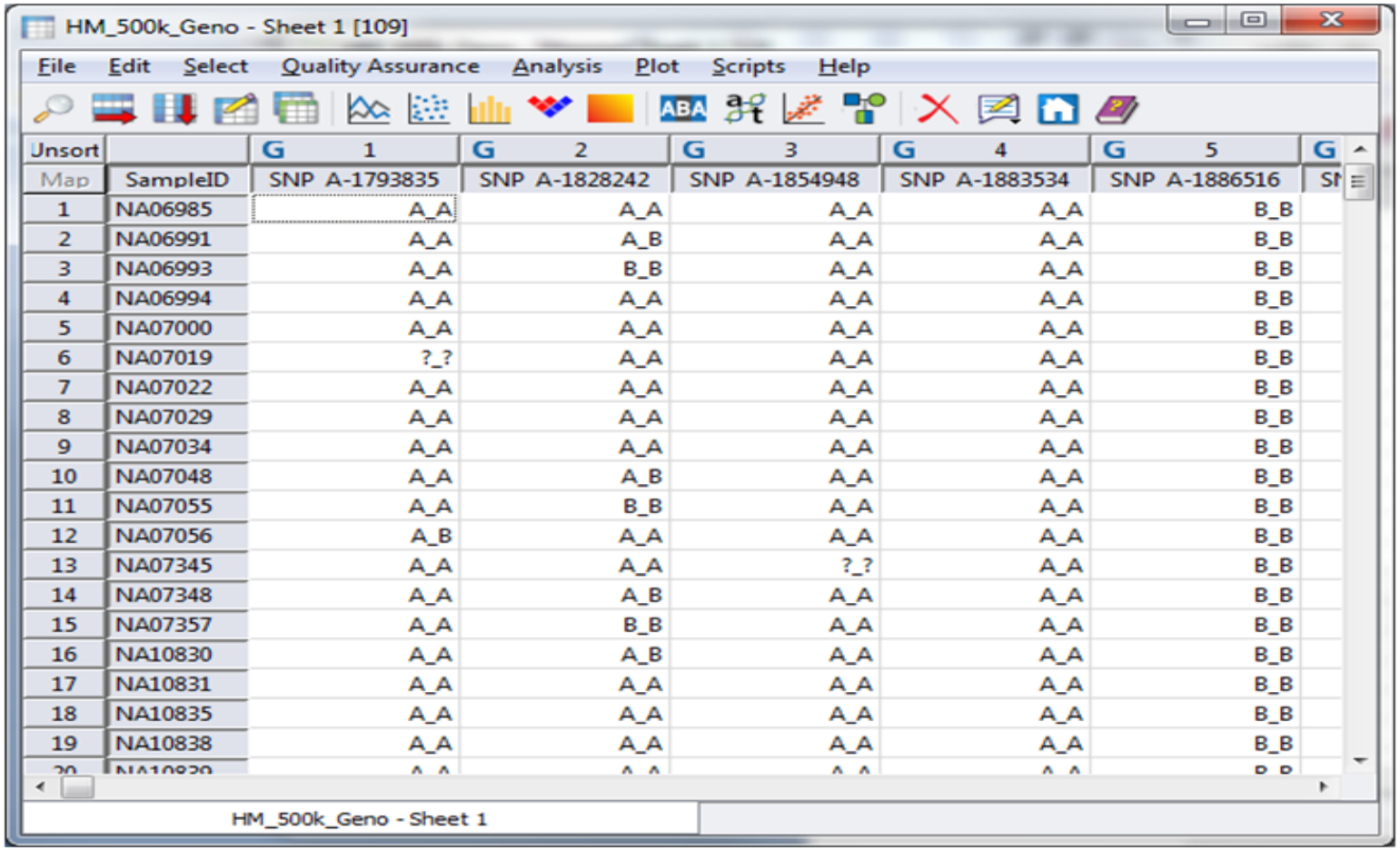
Machine understandable :

Genetic Data

Data type analysed by AI systems

Machine understandable :

Genetic Data


HM_500k_Geno - Sheet 1 [109]

File Edit Select Quality Assurance Analysis Plot Scripts Help

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1	NA06985	A_A	A_A	A_A	A_A	B_B	
2	NA06991	A_A	A_B	A_A	A_A	B_B	
3	NA06993	A_A	B_B	A_A	A_A	B_B	
4	NA06994	A_A	A_A	A_A	A_A	B_B	
5	NA07000	A_A	A_A	A_A	A_A	B_B	
6	NA07019	?_?	A_A	A_A	A_A	B_B	
7	NA07022	A_A	A_A	A_A	A_A	B_B	
8	NA07029	A_A	A_A	A_A	A_A	B_B	
9	NA07034	A_A	A_A	A_A	A_A	B_B	
10	NA07048	A_A	A_B	A_A	A_A	B_B	
11	NA07055	A_A	B_B	A_A	A_A	B_B	
12	NA07056	A_B	A_A	A_A	A_A	B_B	
13	NA07345	A_A	A_A	?_?	A_A	B_B	
14	NA07348	A_A	A_B	A_A	A_A	B_B	
15	NA07357	A_A	B_B	A_A	A_A	B_B	
16	NA10830	A_A	A_B	A_A	A_A	B_B	
17	NA10831	A_A	A_A	A_A	A_A	B_B	
18	NA10835	A_A	A_A	A_A	A_A	B_B	
19	NA10838	A_A	A_A	A_A	A_A	B_B	
20	NA10839	A_A	A_A	A_A	A_A	B_B	

HM_500k_Geno - Sheet 1

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Machine understandable :

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Machine understandable :

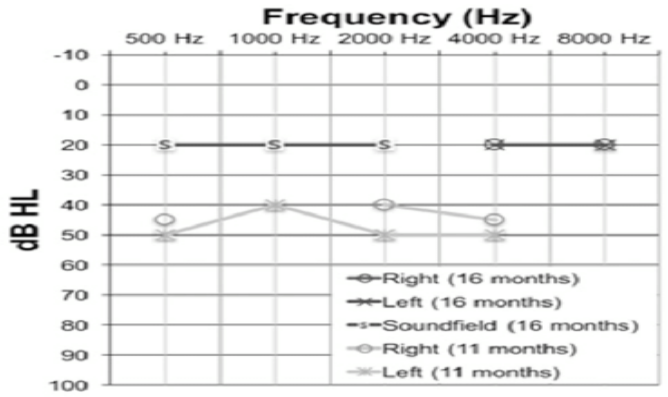
Electrophysiological (EP) data

Data type analysed by AI systems

Machine understandable :

Electrophysiological (EP) data

1



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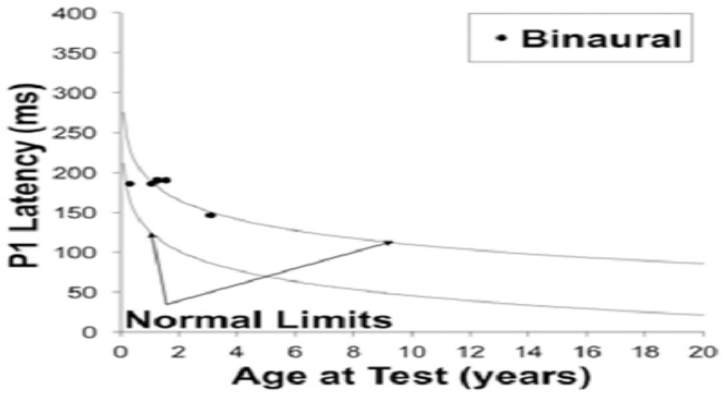

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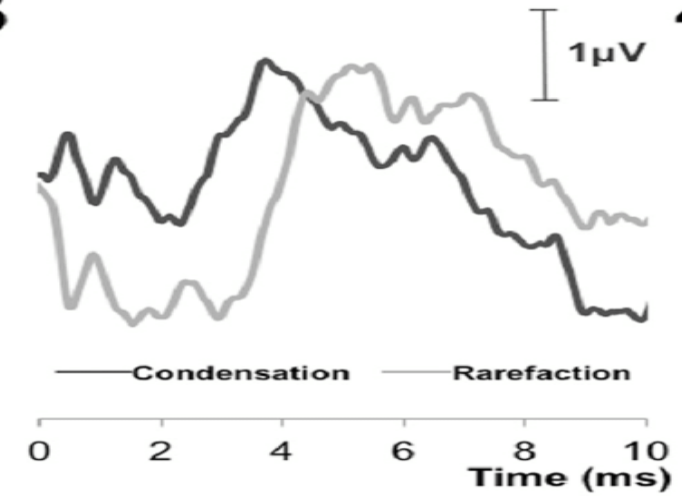

4

Age (months)	IT-MAIS Score
4	19%
11	31%
13	50%
19	86%

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Raw data:

Data type analysed by AI systems

Raw data:

Physical examination notes

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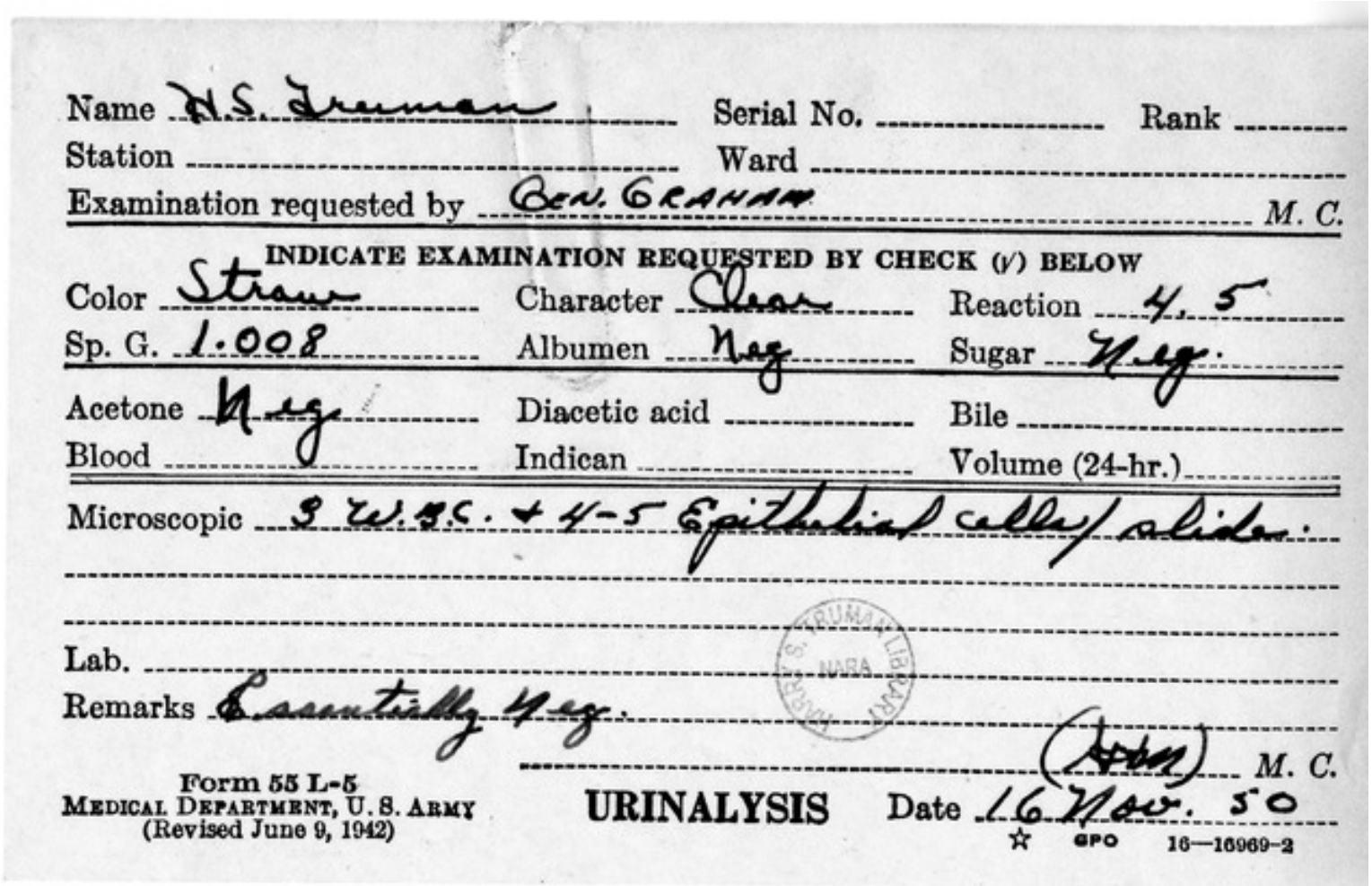
Raw data:

Physical examination notes



Name H.S. Truman Serial No. _____ Rank _____
Station _____ Ward _____
Examination requested by Gen. Graham M. C.

INDICATE EXAMINATION REQUESTED BY CHECK (✓) BELOW

Color Straw Character Clear Reaction 4. 5
Sp. G. 1.008 Albumen Neg Sugar Neg.
Acetone Neg Diacetic acid _____ Bile _____
Blood _____ Indican _____ Volume (24-hr.) _____
Microscopic 3 W.B.C. + 4-5 Epithelial cells/ slide.
Lab. _____
Remarks Essentially Neg. (John) M. C.

Form 55 L-5
MEDICAL DEPARTMENT, U. S. ARMY
(Revised June 9, 1942)

URINALYSIS Date 16 Nov. 50

☆ GPO 16—16969-2

Data type analysed by AI systems

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Raw data:

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Raw data:

Clinical laboratory results

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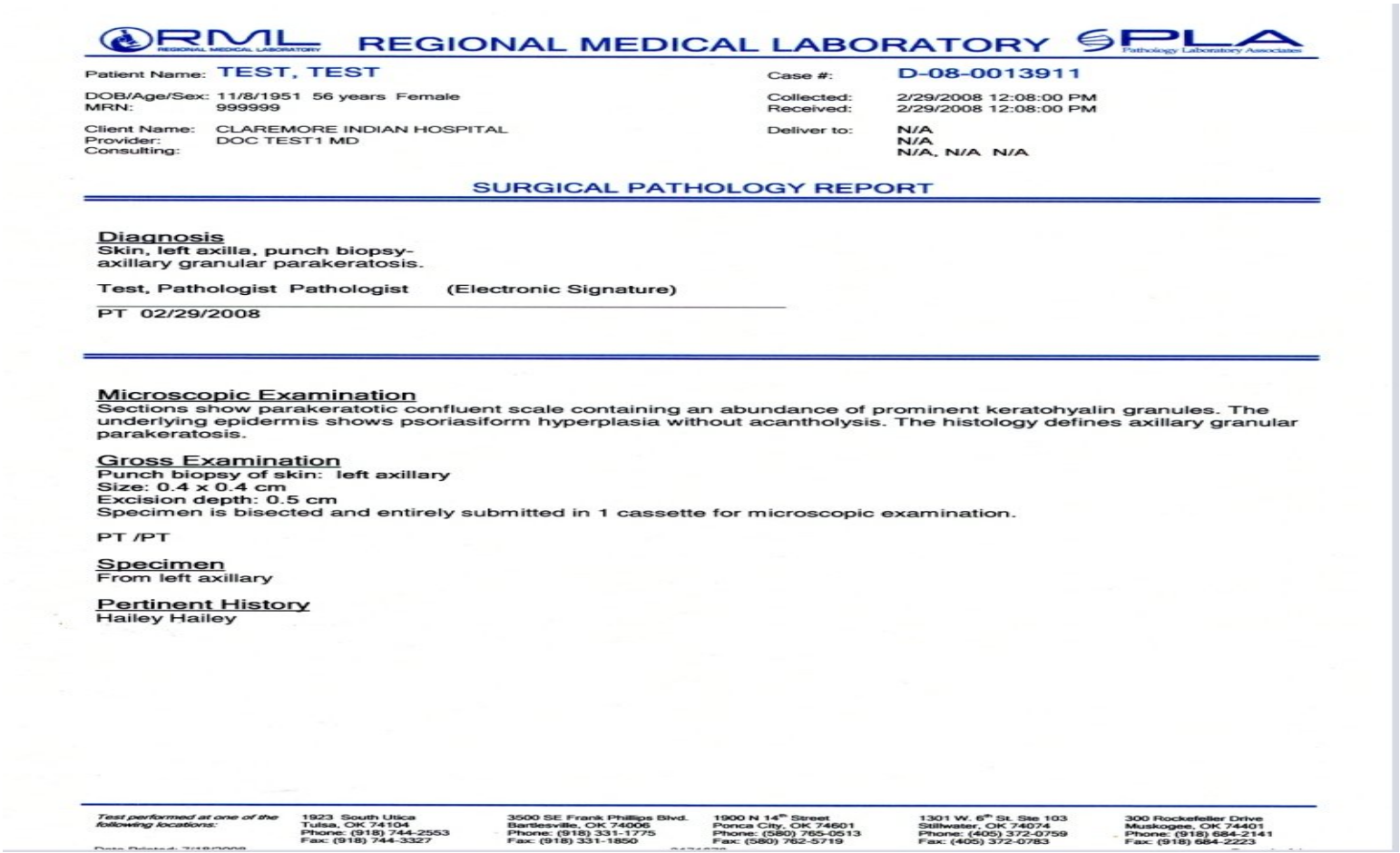
Clinical laboratory results



RML REGIONAL MEDICAL LABORATORY PLA

Patient Name: TEST, TEST
DOB/Age/Sex: 11/8/1951 56 years Female
MRN: 999999
Client Name: CLAREMORE INDIAN HOSPITAL
Provider: DOC TEST1 MD
Consulting:

Case #: D-08-0013911
Collected: 2/29/2008 12:08:00 PM
Received: 2/29/2008 12:08:00 PM
Deliver to: N/A
N/A
N/A, N/A N/A

SURGICAL PATHOLOGY REPORT

Diagnosis
Skin, left axilla, punch biopsy-
axillary granular parakeratosis.

Test, Pathologist Pathologist (Electronic Signature)
PT 02/29/2008

Microscopic Examination
Sections show parakeratotic confluent scale containing an abundance of prominent keratohyalin granules. The underlying epidermis shows psoriasiform hyperplasia without acantholysis. The histology defines axillary granular parakeratosis.

Gross Examination
Punch biopsy of skin: left axillary
Size: 0.4 x 0.4 cm
Excision depth: 0.5 cm
Specimen is bisected and entirely submitted in 1 cassette for microscopic examination.

PT /PT

Specimen
From left axillary

Pertinent History
Hailey Hailey

Test performed at one of the following locations:
1923 South Utica, Tulsa, OK 74104, Phone: (918) 744-2553, Fax: (918) 744-3327
3500 SE Frank Phillips Blvd, Bartlesville, OK 74006, Phone: (918) 331-1775, Fax: (918) 331-1850
1900 N 14th Street, Ponca City, OK 74601, Phone: (580) 765-0513, Fax: (580) 762-5719
1301 W. 6th St. Ste 103, Stillwater, OK 74074, Phone: (405) 372-0759, Fax: (405) 372-0783
300 Rockefeller Drive, Muskogee, OK 74401, Phone: (918) 684-2141, Fax: (918) 684-2223

Algorithms used

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- NLP

Algorithms used

- NLP
- Image Classification using deep learning

Algorithms used

- NLP
- Image Classification using deep learning
    - Residual Network

Algorithms used

- NLP
- Image Classification using deep learning
  - Residual Network
  - Convolution Autoencoder Network

Algorithms used

- NLP
- Image Classification using deep learning
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- Hidden Markov Models

Algorithms used

- NLP
- Image Classification using deep learning
  - Residual Network
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- Hidden Markov Models
- Output Prediction Training usig Deep Learning

Strokes

Stroke is the leading cause of death in china and almost worldwide.
It is caused by thrombus in the vessel called infarction.

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Two major areas :

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Two major areas :

- Early detection and diagnosis

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Two major areas :

- Early detection and diagnosis
- Treatment

Early detection

Early detection

- Movement detecting device

Early detection

Early detection

- Data modeling by hidden markov model

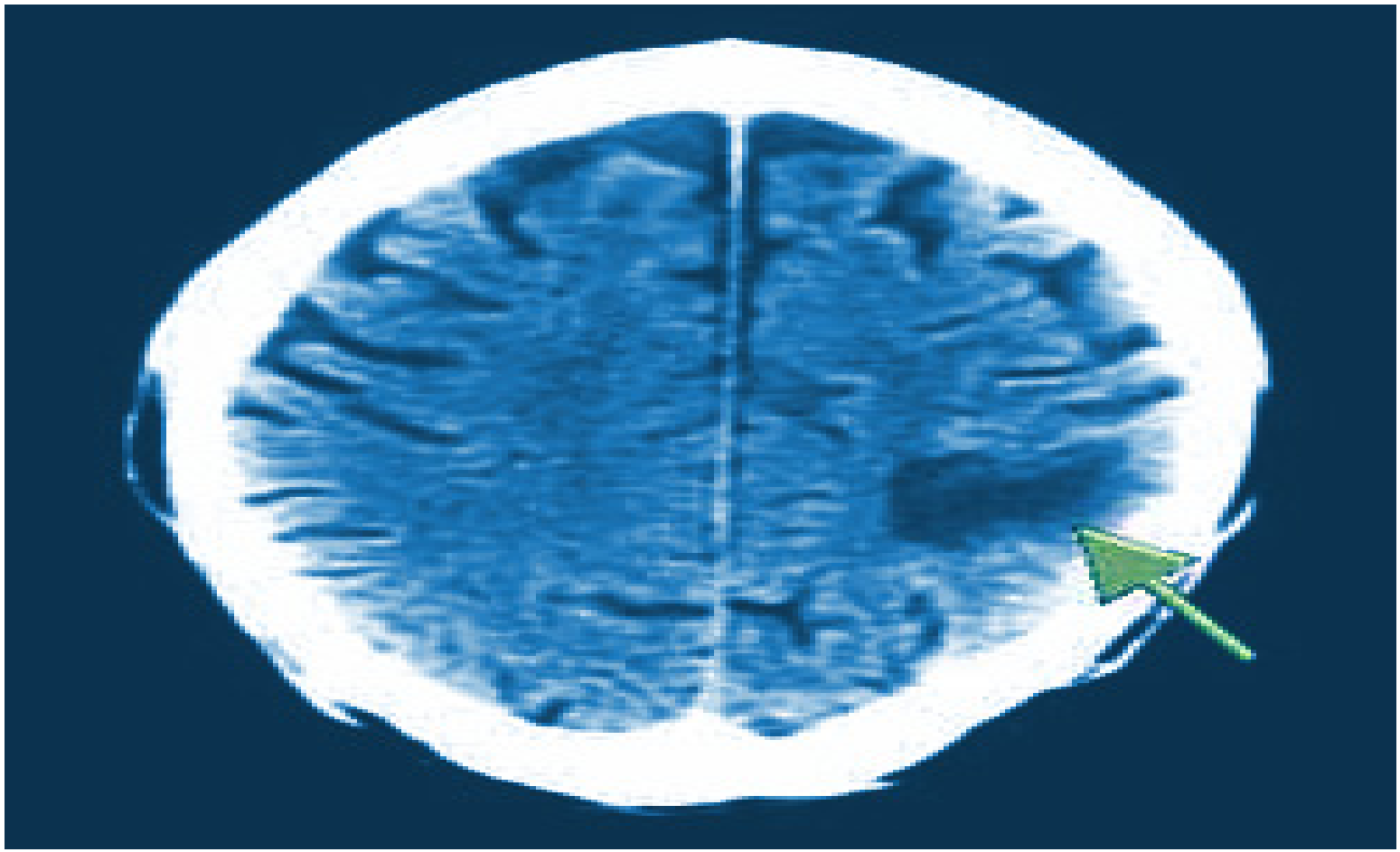
Early detection

Early detection

- Analysing CT scans by applying ML methods

Early detection

- Analysing CT scans by applying ML methods



Treatment

Treatment

- Using thrombolysis(TPA)

A Road To Future

A Road To Future

- Alerting the patient by movement tracking devices

A Road To Future

- Alerting the patient by movement tracking devices
- Help in medication

A Road To Future

- Alerting the patient by movement tracking devices
- Help in medication
- Personalized medicine

Thank you!

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aman.kumar.16001@iitgoa.ac.in