ANALYTICS FOR HOSPITAL'S HEALTH-CARE DATA

INTRODUCTION

Today's healthcare industries are moving from volume-based business into value-based business, which requires an overwork from doctors and nurses to be more productive and efficient. This will improve healthcare practice, changing individual life style and driving them into longer life, prevent diseases, illnesses and infections. Over the last few years, healthcare data has become more complex for the reason that large amount of data are being available lately, along with the rapid change of technologies and mobile applications and new diseases have discovered. Therefore, healthcare sectors have believed that healthcare data analytics tools
are really important subject in order to manage a large amount of complex data, which can lead to improve healthcare industries and help medical practice to reach a high level of efficiency and work flow accuracy, if these data analytics tools applied correctly, but the questions are how healthcare organizations are applying these tools today, and how to think about it's future use? Also, what are the challenges they face when using such tools? And finally, what are the innovations can healthcare add to meet these challenges?

This paper aims to proof that healthcare data analytics techniques are not efficient enough and suitable anymore these days in order to manage big data issue and improve healthcare data analytics due to the rapid growth and evolution of technology.Moreover, it's also aims to promise professionals of a better quality of medical results, as well as reduce time needed to analyze healthcare data by keepin. The proposed technique is recommendedrather than offered, since it will facilitate and enhance healthcare practice, by enabling systems to use data and analyze it efficiently and smoothly, because it will fill the gaps of previous techniques used in the hospitals, handle big data issue and avoid data loss, which will lead to improve care, assist diseases prediction and prevention systems and reduce cost. This technique is promising a better results and more benefits if

it's applied correctly and properly. Professionals (doctors and medical stuff) will be benefited for sure and they will use proposed technique,
since it will reduce their time and efforts, therefore this technique focused also on adding a true assistance to their job to run smoothly as its really stressful andvaluable, so they need a technique that facilitates their job and save their efforts such as: retrieving historical and old data quickly, sorting data in a logical structure way and keep it up to date, which will help them to discover hidden patterns and extract information effortlessly and efficiently. Moreover, professionals will be satisfied as they will touch that this technique will provide and additional source of knowledge to make a better decision (support decision making process) which is really needed to improve individuals' healthcare and increase their reputation.

1.1 PROJECT OVERVIEW

The healthcare industry is undergoing many transformative changes, such as implementing new electronic health record (EHR) systems and processes, and the pace of those changes is likely going to increase. Older approaches to care are quickly being replaced and healthcare organizations will need more effective clinical data management to take advantage of new, potentially transformative trends in technology and analytics.
Some of the trends emerging from efforts to incorporate big data in healthcare include:

- Moving away from acute and episodic care models to value-based care
- Increasing opportunities to benefit from large collections of healthcare data
- Robust analytics that could help resolve complex health challenges

Simplifying collection and organization of healthcare data is a promising first step for most healthcare organizations. But having tools uncover the most useful data in a vast collection of information will be key for organizations to get the most value from big data in healthcare. Healthcare data analytics help organizations uncover vital insights in their data that could help them identify opportunities to provide more value, efficacy and better-quality care at an affordable cost.

1.2 PURPOSE

Data analytics in health care is vital. It **helps health care organizations to evaluate and develop practitioners, detect anomalies in scans and predict outbreaks in illness**, per the Harvard Business School. Data analytics can also lower costs for health care organizations and boost business intelligence.

LITERATURE SURVEY

The healthcare sector is widely considered as one of the most important industries in information technology (Wager 2005). More and more, information technology has been considered as a practice that facilitates healthcare performance through using data and information efficiently within the healthcare sectors. Therefore, Wageret al (2005) said that in order to understand the relation between information technologies and healthcare, we first need to understand what are the technologies used in healthcare. Information technology functions have developed over the last few years not only as a technology services provider, but also as a strategic provider that develops and integrates industries' infrastructures to facilitate and ensure quality of service (LeRouge et al 2007).

In the mid-80,'s information technology changed the healthcare industry and brought many benefits when they used microcomputers, which were a small in shape, fast and very powerful for that time. Moreover, this allowed hospitals to develop clinical applications for various medical care settings. As a result, hospitals started to purchase and adopt information systems in thehealthcare industries, and after that,
challenges began to emerge when professionals tried to integrate data among these systems (Wager et al 2005).

However, Bhattacherjee and Hikmet (2007) and Castro (2007), granted that information technology has improved healthcare industries, but they also highlighted some of the difficulties related to the use of information technology in healthcare sectors, as they noticed that it is hard to implement information technology in small clinics and organizations, with high costs due to reduced efficiencies of scale. Therefore, IT

implementation requires long term training and retention of skilled professionals.

2.2 REFERENCES

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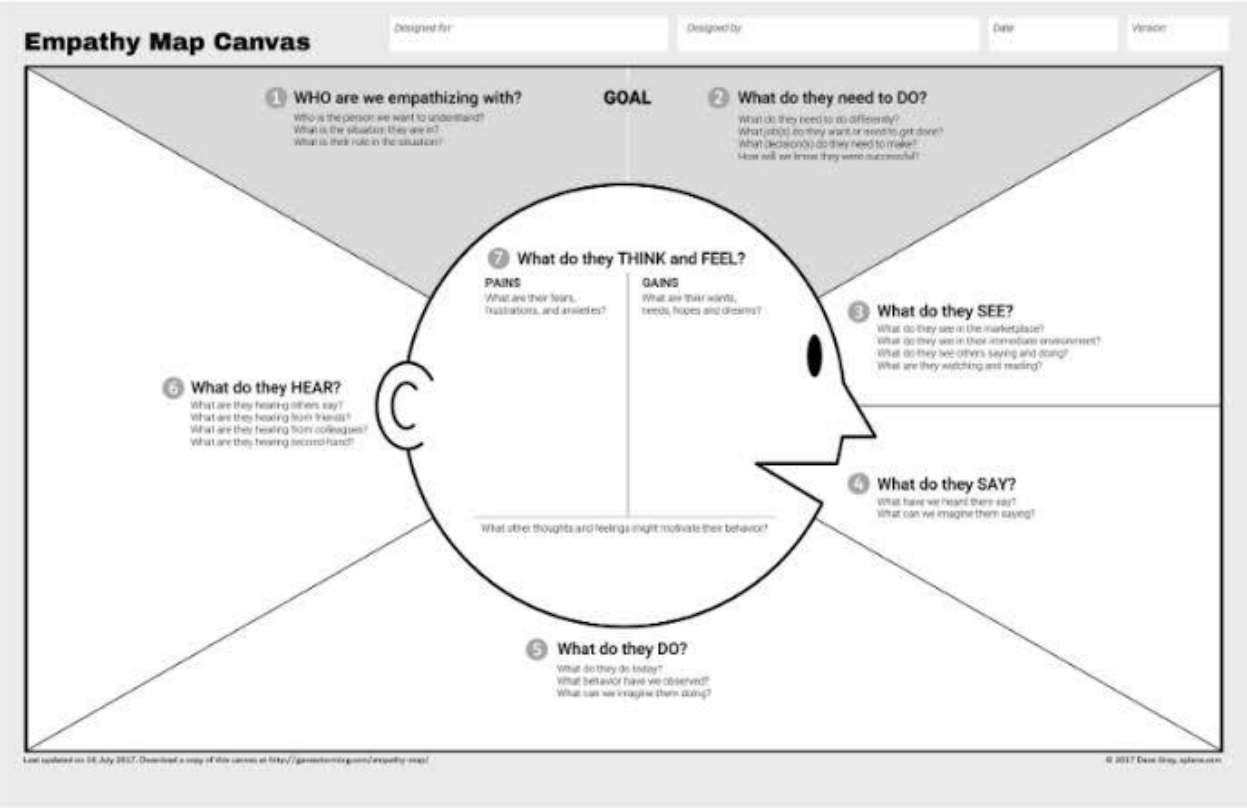
2.3 PROBLEM STATEMENT DEFINITION

Health Care Industry desires to classify the Patients using their pathology
data for their CARE (Self-management, Doctor-Advise, Further Diagnostic and
Chronic Medication) management improvement that facilitates to multi-classification model to build CARE Management Model (CMM) with right classification of patient.

3.IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTROMING

3.3 PROPOSED SOLUTION

Healthcare analytics refers to the use of vast amounts of collected data to provide organizations with actionable insights. These insights are developed through analytical disciplines to drive fact-based decision making. In turn, these decisions improve planning, management, measurement and learning.

Maturity models have been introduced as reference frameworks for Information System (IS) management in organizations within different industries. In the healthcare domain, maturity models have also been used to address a wide variety of challenges and the high demand for hospital IS (HIS) implementations. The increasing volume of data, is exceeded the ability of health organizations to process it for improving clinical and financial efficiencies and quality of care. It is believed that careful and attentive use of Data Analytics (DA) in healthcare can transform data into knowledge that can improve patient outcomes and operational efficiency. A maturity model in this conjuncture, is a way of identifying strengths and weaknesses of the HIS maturity and thus, find a way for improvement and evolution. This paper presents a proposal to measure Hospitals Information Systems maturity with regard to DA. The outcome of this paper is a maturity model, which includes six stages of HIS growth and maturity progression.They are used to store data from sources like spreadsheets, databases, emails, photos, videos, monitoring devices, telemedicine, sensors, EHR etc. This unstructured data creates problems for storage, mining and analyzing data . Veracity: It refers to the noisy and abnormality in healthcare data his unstructured data creates problems for storage, mining and analyzing data . It refers to the noisy and abnormality in healthcare data . It refers to time dependent data in healthcare like in telemedicine patient's information of each second is important during treatment.

1.It provides convenience to the parties involved with HIC. Insurance subscriber does not need to visit the insurance office frequently to purchase an HI and to fill out the premium amount. 2.Communication between insurance subscribers and providers becomes efficient. 3. It makes auditor's complex and tedious work easy. 4. Any kind of fraudulent behavior can be easily identified using AI. 5.It also reduces the human resource cost. 6.Verification of claims becomes fast using web-generated reports.

3.4 PROBLEM SOLUTION FIT:

1. Cost of Care Delivery:

The cost of care delivery is at the center of the problems facing the healthcare Industry. Healthcare spending accounts for ~18% of US GDP. Although industry actors are working to increase the efficiency of care delivery, there is significant pressure on revenue with newer payment/reimbursement models making it difficult to even maintain historical financial parity.

There is a critical need to use data and analytics to identify trends that enable healthcare organizations to increase the effectiveness of care, reduce errors, better understand risk, reduce costs, increase operational efficiency, and capture maximum reimbursements for care delivery. Healthcare has been slow to implement modern data and analytics capabilities, leaving healthcare leaders without the proper information to make decisions and affect positive change.

2. Industry Consolidation:

In the quest to increase efficiencies, industry consolidation has been rampant. Although consolidation promises long term operational efficiencies, it typically has a long payoff from an information visibility and insight perspective. Hospitals and payers are complex businesses and organizations, have complex data and applications systems, and are subject to many regulatory rules and hurdles, particularly around data security. When large players are combined, it typically takes years to achieve a reasonable level of consistency and access to data.

3. Increase in Available Data:

The proliferation of electronic health records systems, medical devices, and digital health has resulted in huge increases in the volume and variety of healthcare data, and is still picking up speed – this is truly Big Data. This presents vast opportunities to improve care through clinical research, improved care paths, mobile health and otherwise, however, it also presents significant data management and governance challenges for healthcare organizations.

Healthcare organizations are starved for the architectures, tools, processes, and policies needed to drive consistency, access, security, understanding, trust, and management of this deluge of Big Data. Unlocking the treasure trove of value held within this data requires implementing modern data management, analytics and governance systems, and programs to turn this data into information. This includes modern BI, predictive analytics, and artificial intelligence systems to enable forward-looking insight and action from this information.

4.REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL REQUIREMENTS:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN

FR-2	User Conformation	Confirmation via Email Confirmation via OTP
FR-3	User profile	User Details Farm Details
FR-4	Required Data	The past crop yield data and data of the farmer to analyze their yield.

Non-functional Requirements:

Following are the non-functional requirements proposedsolution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Ease of usage along with ease in-access of tools and features
NFR-2	Security	The user information is protected by the user login and registration with a secured password
NFR-3	Reliability	The interactive data visuals of the dashboard can make easy to understand by the farmers

NFR-4	Performance	Multiple technologies and services that will improve the usability in agricultural activities.
NFR-5	Availability	The dashboard could be easily available viewed in every devices like smart phones, laptops and systems, etc
NFR-6	Scalability	Should be able to incorporate as many visualization and datasets as possible

5.2 Solution and Technical Architecture

Solution Architecture:

Solution architecture is a complex process – with many sub-processe-that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems. Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed and delivered.

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Table-1 : Components & Technologies

S.NO	Component	Describtion	Technology
1	Application	How user interacts with application	IBM Cognos analytics
2	Data preparation	The data Cleaning	IBM Cognos analytics

3	Data exploration	Analyzing the data	IBM Cognos analytics
4	Data visualization	Creating dashboards and visualizations	IBM Cognos analytics
5	Database	CSV file	MySQL, Spreadsheets
6	Cloud Database	Database Service on Cloud	IBM Cloud

S.NO	Characteristics	Description	Technology
1	Open-Source Frameworks	To generate evidence about all aspects of healthcare.	IBM Cognos analytics
2	Security Implementations	Healthcare extends to every place that data could be used or accessed – including the endpoint.	Access technologies in Cognos analytics
3	Scalable Architecture	Architecture Proposes a novel data lake architecture to reduce the data ingestion time and improve the precision of healthcare analytics.	IBM Cognos analytics
4	Availability	Analyzing current and historic industry data to trends, improve outreach, and manage the spread of diseases.	IBM Cognos analytics

6.PROJECT PLANNING & SCHEDULING

6.1 Sprit planning & estimation

Sprint planning is an event in scrum that kicks off the sprint. The purpose of sprint planning is to define what can be delivered in the sprint and how that work will be achieved.Sprint planning is done in collaboration with the whole scrum team.

In Scrum Projects, Estimation is done by the entire team during Sprint Planning Meeting. The objective of the Estimation would be to consider the User Stories for the Sprint by Priority and by the Ability of the team to deliver during the Time Box of the Sprint.

By analyzing patient data, healthcare providers can lower readmission rates, reduce errors, and better identify at-risk populations. The types of patient data used in these analyses include blood sugar level**,** temperature**,** blood test results**,** and the patient's **own wishes for care**.

6.2 Sprint Delivery Schedule

Healthcare analytics refers to the use of vast amounts of collected data to provide organizations with actionable insights. These insights are developed through analytical disciplines to drive fact-based decision making. In turn, these decisions improve planning, management, measurement and learning.

As healthcare organizations around the world are challenged to reduce costs, improve coordination with care teams, provide more with less, and focus on improving patient care, analytics will be especially important. Primary care physician and nursing shortages are requiring overworked professionals to be even more productive. Plus, new businesses entering the market and new approaches to healthcare delivery will increase competition in the industry.

7.CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1

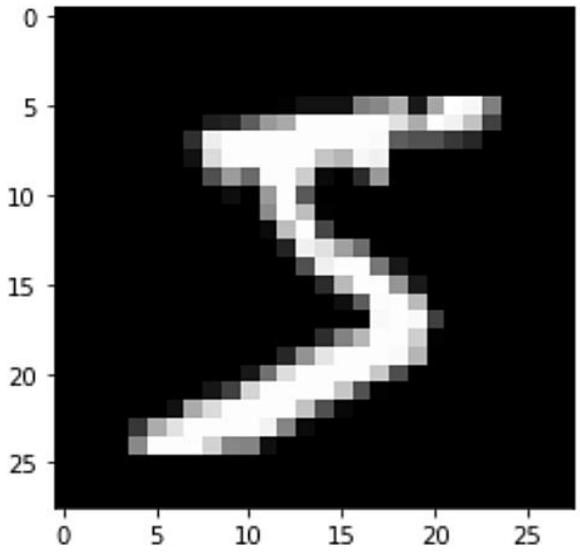
```
import cv2
import numpy as np
from keras.datasets import mnist
from keras.layers import Dense, Flatten, MaxPooling2D, Dropout
from keras.layers.convolutional import Conv2D
from keras.models import Sequential
from keras.utils import to_categorical
import matplotlib.pyplot as plt

(X_train, y_train), (X_test, y_test) = mnist.load_data()
```

Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz

11490434/11490434 [==============================] - 0s 0us/step

```
## Looking at a sample
plt.imshow(X_train[0], cmap="gray")
plt.show()
print (y_train[0])
```



Data Preprocessing
Reshaping Stuff We need to reshape our dataset inputs (X_train and X_test) to the shape that
our model expects when we train the model. The first number is the number of images
(X_train -> 60000, X_test -> 10000). Then comes the shape of each image i.e. (28, 28). The
last number 1 signifies that the image is greyscale

```
## Checking out the shapes involved in dataset
print ("Shape of X_train: {}".format(X_train.shape))
print ("Shape of y_train: {}".format(y_train.shape))
print ("Shape of X_test: {}".format(X_test.shape))
print ("Shape of y_test: {}".format(y_test.shape))
Shape of X_train: (60000, 28, 28)
Shape of y_train: (60000,)
Shape of X_test: (10000, 28, 28)
Shape of y_test: (10000,)
# Reshaping so as to convert images for our model
X_train = X_train.reshape(60000, 28, 28, 1)
X_test = X_test.reshape(10000, 28, 28, 1)
print ("Shape of X_train: {}".format(X_train.shape))
print ("Shape of y_train: {}".format(y_train.shape))
print ("Shape of X_test: {}".format(X_test.shape))
```

```
print ("Shape of y_test: {}".format(y_test.shape))
```
Shape of X_train: (60000, 28, 28, 1)
Shape of y_train: (60000,)
Shape of X_test: (10000, 28, 28, 1)
Shape of y_test: (10000,)

One-Hot Encoding
We need to hot encode our target variables. Basically, a column will be created for each kind
of output and a binary variable is inputted for each kind. For example, if the image is of the
number 6, then the label instead of being = 6, it will have a value 1 in column 7 and 0 in rest
of the columns, like [0,0,0,0,0,0,1,0,0]

```
### Lets one hot encode labels
y_train = to_categorical(y_train)
y_test = to_categorical(y_test)
```
Building the model
Let's build the model

```
## Declare the model
model = Sequential()

## Declare the layers
layer_1 = Conv2D(64, kernel_size=3, activation='relu', input_shape=(28, 28, 1))
layer_2 = MaxPooling2D(pool_size=2)
layer_3 = Conv2D(32, kernel_size=3, activation='relu')
layer_4 = MaxPooling2D(pool_size=2)
layer_5 = Dropout(0.5)
layer_6 = Flatten()
layer_7 = Dense(128, activation="relu")
layer_8 = Dropout(0.5)
layer_9 = Dense(10, activation='softmax')
## Add the layers to the model
model.add(layer_1)
```

```
model.add(layer_2)
model.add(layer_3)
model.add(layer_4)
model.add(layer_5)
model.add(layer_6)
model.add(layer_7)
model.add(layer_8)
model.add(layer_9)
```

The model type that we will be using is Sequential.
Sequential is the easiest way to build a model in Keras. It allows to build the model layer by layer. add() function is used for adding successive layers.

Kernel Size is the size of the filter matrix for our convolution. So, kernel size 3 means that a 3x3 filter matrix is going to be used.

Pool Size is the size of the filter window which will be used by MaxPooling Layers for the max pooling operation. So, pool size 2 means that a 2x2 window will be used for performing each iteration of max pooling operation.

Activation is the activation function for the layer. The activation function here being used for the first 2 layers is the ReLU, or Rectified Linear Activation. This activation function is known for performing well in terms of speed and output in the neural
nets.

7.2 Feature 2

Metrics - To make things easier to interpret, we will be using 'accuracy' metrix to see
the accuracy score on the validation set while training the model.

```
model.compile(optimizer='adam', loss='categorical_crossentropy',
metrics=['accuracy'])
```

Training the model

```
model.fit(X_train, y_train, validation_data=(X_test, y_test), epochs=3)
Epoch 1/3
```

```
1875/1875 [==============================] - 85s 45ms/step -
loss: 0.9582 -
accuracy: 0.7720 - val_loss: 0.1465 - val_accuracy: 0.9575
Epoch 2/3
1875/1875 [==============================] - 88s 47ms/step -
loss: 0.2840 -
accuracy: 0.9151 - val_loss: 0.0862 - val_accuracy: 0.9742
Epoch 3/3
1875/1875 [==============================] - 84s 45ms/step -
loss: 0.2130 -
accuracy: 0.9368 - val_loss: 0.0653 - val_accuracy: 0.9802
```

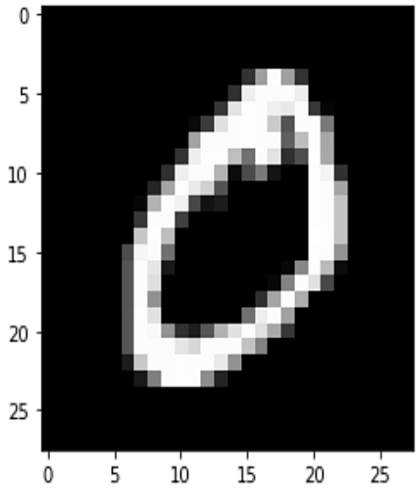
Predicting and Testing

```
example = X_train[1]
prediction = model.predict(example.reshape(1, 28, 28, 1))
print ("Prediction (Softmax) from the neural network:\n\n
{}".format(prediction))
hard_maxed_prediction = np.zeros(prediction.shape)
hard_maxed_prediction[0][np.argmax(prediction)] = 1
print ("\n\nHard-maxed form of the prediction: \n\n
{}".format(hard_maxed_prediction))
print ("\n\n--------- Prediction --------- \n\n")
plt.imshow(example.reshape(28, 28), cmap="gray")
plt.show()
print("\n\nFinal Output: {}".format(np.argmax(prediction)))
```

```
1/1 [==============================] - 0s 103ms/step
Prediction (Softmax) from the neural network:
[[9.9999738e-01 9.5464214e-10 2.2212889e-07 6.9435202e-10
6.2112551e-09
5.3277843e-10 8.0331188e-07 2.5352099e-07 1.1882761e-06 8.3343465e-
08]]

Hard-maxed form of the prediction:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]]

--------- Prediction ---------
```



Final Output: 0

Let's test our model on a real image

For that first of all, we will preprocess the image

These are the steps for preprocessing the image:

Convert that image to greyscale

Binarize(threshold) the greyscaled image in such a way that only the digits in the image are white and rest is black

Using the binarized image, find contours in the image. Here, contours will provide us the individual digits in the image

Now, we have the digits. But we have to modify it further in such a way that it becomes a lot more similar to the images present in the training dataset.

Now, looking at an image in dataset. We can infer that the image has to be of shape (28, 28), it should contain the digit white colored and background black colored, and the digit in the image is not stretched to the boundaries, instead, around the digit, in each of the four sides, there is a 5 pixel region (padding) of black color. (You"ll understand this fully if you check out any of the image from the dataset).

So, now for modifying our image, we'll resize it to (18,18)

Then, we will add a padding of zeros (black color) of 5 pixels in each direction (top, bottom, left, right).

So, the final padded image will be of the size (5+18+5, 5+18+5) = (28, 28), which is what we wanted.

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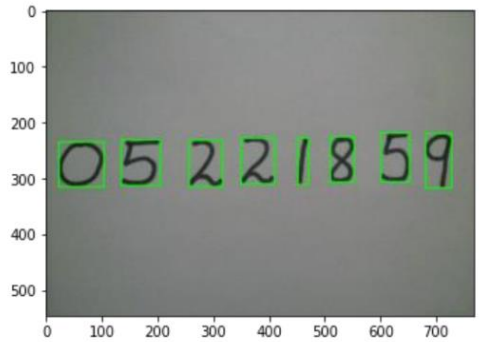
So, the final padded image will be of the size (5+18+5, 5+18+5) = (28, 28), which is what we wanted.

7.3 Database Schema(if Applicable)

```
image = cv2.imread('/content/test_image.jpg')
grey = cv2.cvtColor(image.copy(), cv2.COLOR_BGR2GRAY)
ret, thresh = cv2.threshold(grey.copy(), 75, 255,
cv2.THRESH_BINARY_INV)
contours,hierarchy= cv2.findContours(thresh.copy(),
cv2.RETR_EXTERNAL,
cv2.CHAIN_APPROX_SIMPLE)
preprocessed_digits = []
for c in contours:
x,y,w,h = cv2.boundingRect(c)
```

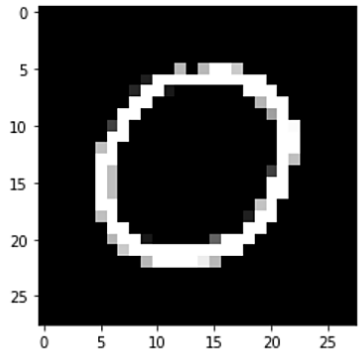
```
# Creating a rectangle around the digit in the original image (for
displaying the digits fetched via contours)
cv2.rectangle(image, (x,y), (x+w, y+h), color=(0, 255, 0),
thickness=2)

# Cropping out the digit from the image corresponding to the
current contours in the for loop
digit = thresh[y:y+h, x:x+w]
# Resizing that digit to (18, 18)
resized_digit = cv2.resize(digit, (18,18))
# Padding the digit with 5 pixels of black color (zeros) in
each side to finally produce the image of (28, 28)
padded_digit = np.pad(resized_digit, ((5,5),(5,5)), "constant",
constant_values=0)
# Adding the preprocessed digit to the list of preprocessed
digits
preprocessed_digits.append(padded_digit)
print("\n\n\n----------------Contoured Image--------------------")
plt.imshow(image, cmap="gray")
plt.show()
inp = np.array(preprocessed_digits)
---------------------------------------------------------------------------
AttributeError Traceback (most recent call last)
in
1 image = cv2.imread('/content/test_image.jpg')
----> 2 grey = cv2.cvtColor(image.copy(), cv2.COLOR_BGR2GRAY)
3
4 ret, thresh = cv2.threshold(grey.copy(), 75, 255,
cv2.THRESH_BINARY_INV)
5 contours,hierarchy= cv2.findContours(thresh.copy(),
cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE)
AttributeError: 'NoneType' object has no attribute 'copy'
```




```
for digit in preprocessed_digits:
prediction = model.predict(digit.reshape(1, 28, 28, 1))
print ("\n\n---------------------------------------\n\n")
print ("=========PREDICTION========== \n\n")
plt.imshow(digit.reshape(28, 28), cmap="gray")
plt.show()
print("\n\nFinal Output: {}".format(np.argmax(prediction)))
print ("\nPrediction (Softmax) from the neural network:\n\n
{}".format(prediction))
hard_maxed_prediction = np.zeros(prediction.shape)
hard_maxed_prediction[0][np.argmax(prediction)] = 1
print ("\n\nHard-maxed form of the prediction: \n\n
{}".format(hard_maxed_prediction))
print ("\n\n---------------------------------------\n\n")
```

```
NameError Traceback (most recent call last)
in
----> 1 for digit in preprocessed_digits:
2 prediction = model.predict(digit.reshape(1, 28, 28, 1))
3 print ("\n\n---------------------------------------\n\n")
4 print ("=========PREDICTION========== \n\n")
5 plt.imshow(digit.reshape(28, 28), cmap="gray")
NameError: name 'preprocessed_digits' is not defined
=========PREDICTION==========
```



Final Output: 0
Prediction (Softmax) from the neural network:
[[9.9999917e-01 3.5340183e-14 2.2112522e-08 2.8153077e-11
1.4685572e-11
4.8874613e-11 5.5869581e-08 1.5508652e-12 6.5314953e-07 1.1440835e-
07]]
Hard-maxed form of the prediction:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]]

8.TESTING

8.1 Test Cases

Testers develop test cases, write test scripts, and test the systems and software under development. The testing process includes defining platform coverage and the test execution environment; analyzing test results; and using integrated change management software to submit defects.Test managers and test leads prepare for and manage the overall test effort. The test management

process includes preparing for testing by organizing with categories; setting up a review process; developing test plans; associating requirements from an inttegrated requirements management application; and tracking the overall test effort.

Test managers and test leads are responsible to plan and start the test effort during a development iteration. Preparation involves learning about common practices, considering various aspects of the test effort, and determining which steps to take first.

8.2 User AcceptanceTesting

User acceptance testing (UAT), also called application testing or end-user testing, is a phase of software development in which the software is tested in the real world by its intended audience.
User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application t the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done.

The healthcare domain is rather specific. Moreover, it is subject to strict regulatory constraints and severe competition. As far as healthcare app development is concerned, brand name, reputation, and even human lives and health are at stake. To eliminate all possible risks, it is highly important to conduct all the necessary types of software testing. User acceptance testing is one of them. The thing is that healthcare apps are designed for the most diverse medical specialties and can target either doctors or patients. Since user acceptance testing implies the involvement of real users and domain experts in the process of software testing, it can provide a product team with valuable insights and let it understand if the app will be well accepted by a target audience as well as whether the healthcare app is ready to be moved to production.

9.RESULTS

9.1 Performance Matrices

Today's healthcare industries are moving from volume-based business into value-based business, which requires an overwork from doctors and nurses to be more productive and efficient. This will improve healthcare practice, changing individual life style and driving them into longer life, prevent diseases, illnesses and infections.

Health data is any data relating to the health of an individual patient or collective population. This information is gathered from a series of health information systems (HIS) and other technological tools utilized by health care professionals, insurance companies and government organizations.

With digital data collection, there is more and more health care data to be analyzed every second. With the increase of electronic record keeping, applications and other electronic means of data collection and storage, there is a significant amount of data being collected in real time.

These data sets are so complex that traditional processing software and storage options cannot be used. Cloud storage is a necessity when dealing with "Big Data." Cloud storage is built to be secure, an absolute must when dealing with sensitive patient information. It is also very cost-efficient and has been helpful in lowering the increasing cost of health care.

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES

Improve performance by providing quality treatment that is based on data.

Treatment for those needing emergency services can be expensive and complicated.

Identify and recruit prospective members by profile analysis and quantitative research.

Monitor patient health results to determine the success of specific programs and procedures in an objective manner.

Change in the quality of life.

DISADVANTAGES

Risk related to breach of protected health information

Risk related to alteration of data that may be used to make wrong healthcare decisions

Risk related to alteration of device functionality that results in adverse events

Patients interact with technology instead of a live care provider.

Lack of empathy

Risk of miscommunication

Clinicians spend more time struggling with technology rather than patient care

Too much reliance on technology – specifically on poor AI implementation that don't produce good outcomes.

11.CONCLUSION

Big data is the reality and is going to stay there for a long time. While have a care management model by any hospital they can predict the future condition of any patient without any wait. Time is a major problem for health care. Within the time anything may happens. So life is saved by care management model. So the model created by this project is so important in the everyday life. But the project model wants to more accurate. The only way to improve the accuracy of this model is collect more data and applies it for modelling. So in future hospital have to concentrate on big data preparation and management in order to create a good model for the system. The project suggest to gain success hospital need to change service manner and increase service on patients who are professionally unbalanced and try to

efficiently utilise care management model for patients, serious and quick action needed when pathology values get changing abnormally.

13. APPENDIX

Github Link

https://github.com/IBM-EPBL/IBM-Project-36227-1660293539

PROJECT DEMO LINK

https://youtu.be/9MXyFjHmrME