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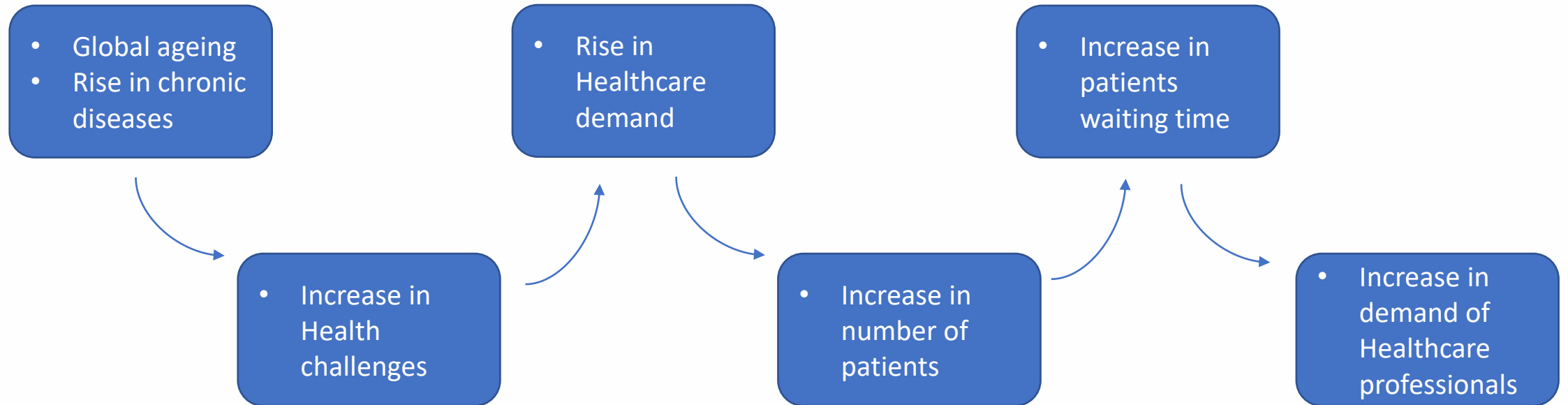
Improving Healthcare Delivery with AI: A Diagnostic and Prescriptive Recommender System

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Problem Description

Gap between healthcare demand and available healthcare professionals



What could be the solution?

Increase in health service efficiency?

Solution

Healthcare
Professionals



Artificial
Intelligence



Improved
Healthcare
Efficiency



Objectives

- Develop an AI based diagnostic system
- Integrate electronic health record in to the system
- Validate and assess accuracy of the system



Methodology

- Obtain electronic health record in form of dataset
- Create an AI model and train the model with the data



Electronic health record



Random Forest Model

| Name | Date of Birth | Gender | Symptoms | Causes | Disease | Medicine |
|------------|---------------|--------|-------------------|-----------------|-------------|-----------------|
| John Doe | 05-15-1980 | Male | Fever, Cough | Viral infection | Common Cold | Ibuprofen, Rest |
| Jane Smith | 08/10/1992 | Female | Headache, fatigue | Stress | Migraine | Sumatriptan |

Methodology - workings

Importing the required libraries

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, accuracy_score, confusion_matrix, f1_score, matthews_corrcoef
```

Methodology - workings

Data Preparation

```
# Importing the dataset  
data = pd.read_csv("medical data.csv")  
data
```

| | Name | DateOfBirth | Gender | Symptoms | Causes | Disease | Medicine |
|---|-------------|-------------|--------|---------------------|---------------------|-----------------|-------------------|
| 0 | John Doe | 15-05-1980 | Male | Fever, Cough | Viral Infection | Common Cold | Ibuprofen, Rest |
| 1 | Jane Smith | 10-08-1992 | Female | Headache, Fatigue | Stress | Migraine | Sumatriptan |
| 2 | Michael Lee | 20-02-1975 | Male | Shortness of breath | Pollution | Asthma | Albuterol Inhaler |
| 3 | Emily Chen | 03-11-1988 | Female | Nausea, Vomiting | Food Poisoning | Gastroenteritis | Oral Rehydration |
| 4 | Alex Wong | 12-06-2001 | Male | Sore Throat | Bacterial Infection | Strep Throat | Penicillin |

Activate Windows
Go to Settings to activate Windows.

Methodology - workings

Data cleaning and encoding

```
# Removing the rows with NaN and encoding the data  
data = data.dropna()  
encoder = LabelEncoder()  
encoded_data = data.copy()  
for column in encoded_data.columns:  
    if encoded_data[column].dtype == 'object':  
        encoded_data[column] = encoder.fit_transform(encoded_data[column])
```


Methodology - workings

Diagnosis Prediction

```
# Splitting the data into features (x) and target (y)

x = encoded_data.drop(["Disease","Medicine"],axis =1)
y = encoded_data["Disease"]

# Splitting the data for training and testing
x_train,x_test,y_train,y_test = train_test_split(x,y, test_size = 0.2, random_state = 30)

# creating a Randomforest model
random_forest_model = RandomForestClassifier(random_state = 30)

# Training the model
random_forest_model.fit(x_train, y_train)

# Testing the model
y_pred = random_forest_model.predict(x_test)
```

Methodology - workings

Prescription Prediction

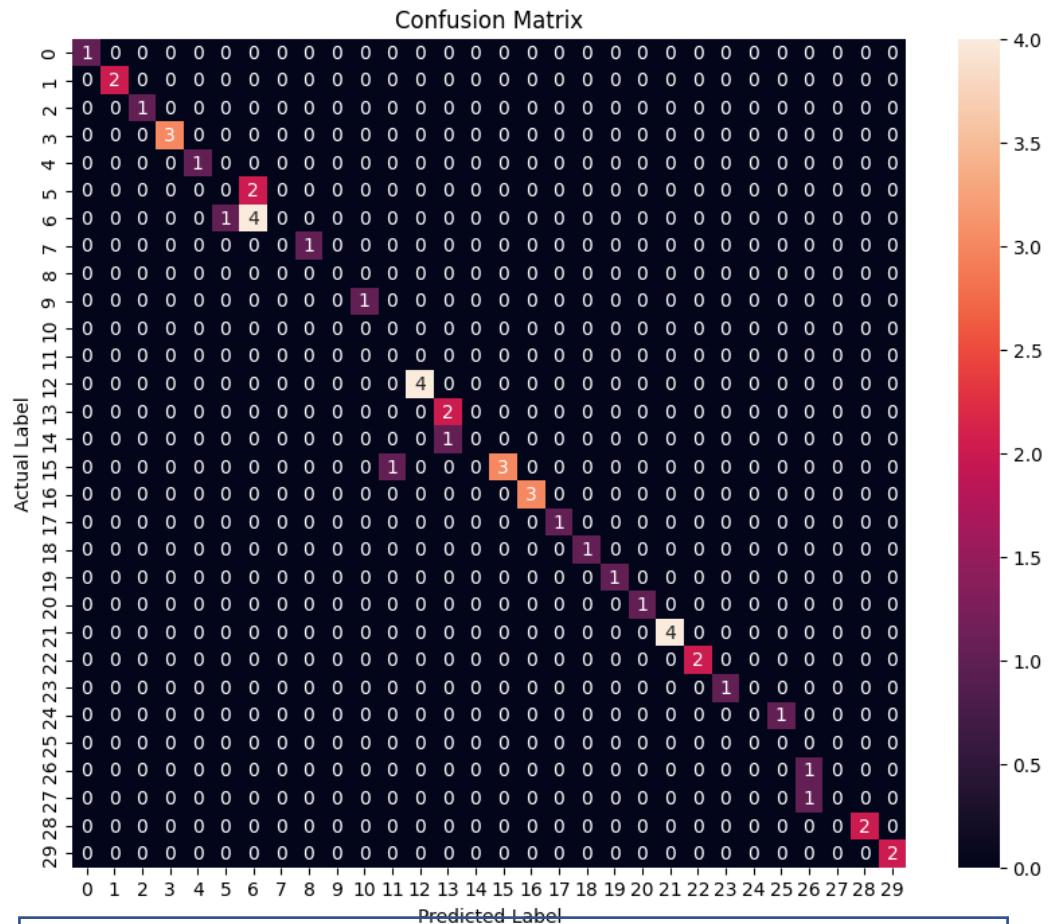
```
# Splitting the data into features (x) and target (y)  
  
x = encoded_data.drop(["Medicine"],axis =1)  
y = encoded_data["Medicine"]  
  
# Splitting the data for training and testing  
x_train,x_test,y_train,y_test = train_test_split(x,y, test_size = 0.2, random_state = 30)  
  
# creating a Randomforest model  
random_forest_model = RandomForestClassifier(random_state = 30)  
  
# Training the model  
random_forest_model.fit(x_train, y_train)  
  
# Testing the model  
y_pred = random_forest_model.predict(x_test)
```

Result

- ❑ Electronic Health Record Dataset Size – 287 rows
- ❑ Machine Learning Model – Random Forest
- ❑ Disease Diagnosis Prediction Accuracy - 81.63%
- ❑ Medicine Prescription Prediction Accuracy – 87.75%

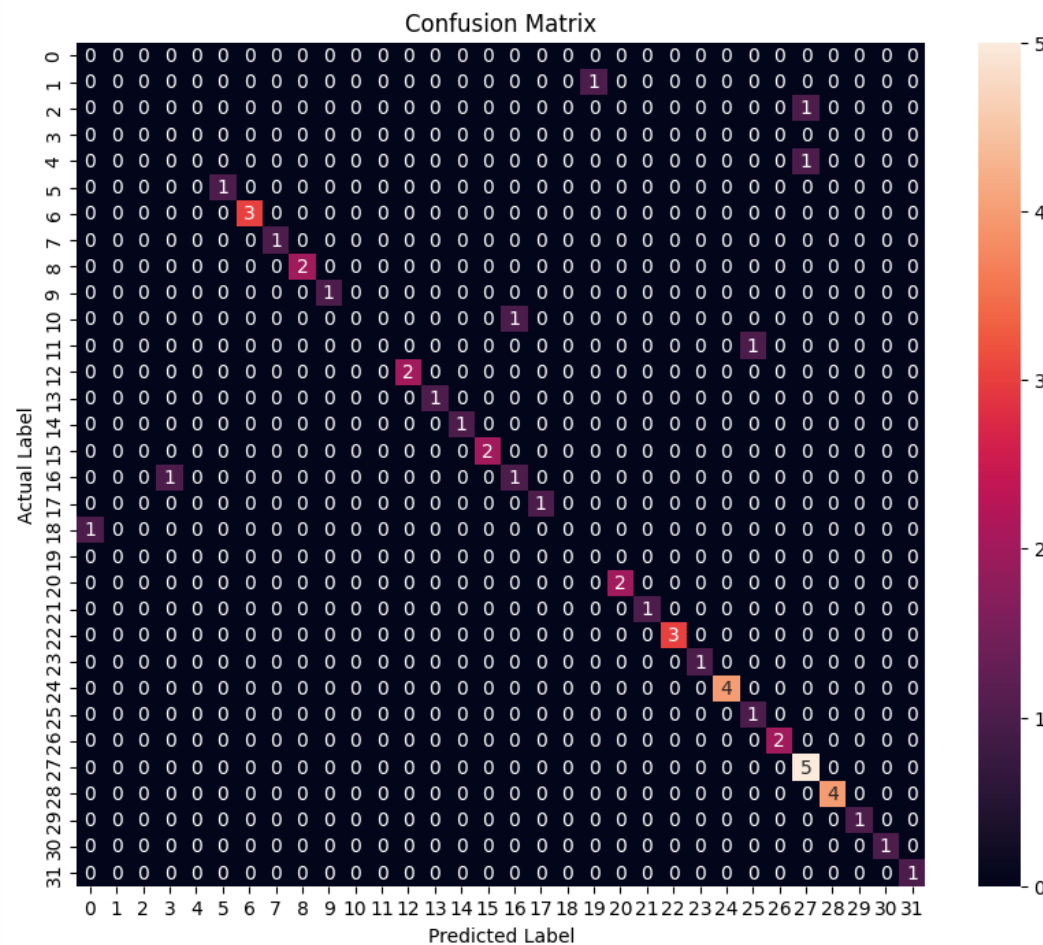


Result



Confusion Matrix for Diagnostic Prediction

Result



Confusion Matrix for Prescriptive Prediction

Conclusion

The integration of artificial intelligence with healthcare delivery holds significant potential to transform the sector by providing enhanced patient outcomes, and improved diagnostic accuracy

References

- Secinaro S, Calandra D, Secinaro A, Muthurangu V, Biancone P. The role of artificial intelligence in healthcare: A structured literature review. *BMC Medical Informatics and Decision Making*, 2021; 21, 1-23.
- Tadiboina S.N Benefits of artificial intelligence in healthcare. *Webology* 2021; (ISSN:1735-188X), 18(5).
- Reddy S, Fox J, Purohit M. P. Artificial intelligence-enabled healthcare delivery. *Journal of the Royal Society of Medicine*, 2019; 112(1), 22-28

*Thank
you*

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