

# Smart Care Through Digital Transformation



**IMT 598**

**Group 5 - Healthcare**

# OUR TEAM



VINEETA



NANDINI



BUVANA



JOSH

# AGENDA

01

INTRODUCTION

02

DIGITAL TRANSFORMATION  
STRATEGY & PHASES

03

SOLUTION & MACHINE LEARNING  
METHODOLOGY

04

DEMO & LIMITATIONS

# US HEALTHCARE INDUSTRY - HIGHEST SPENDING, WORST OUTCOME



**Highest spending on  
healthcare sector than  
any other country**



**Lowest life expectancy**



**Highest chronic disease %**

# CUSTOMER SATISFACTION



**84%**

**of customer say the  
experience a company  
provides is as important  
as its products &  
services**

# BUSINESS MODEL ANALYSIS



**Move to personalised  
predictions**

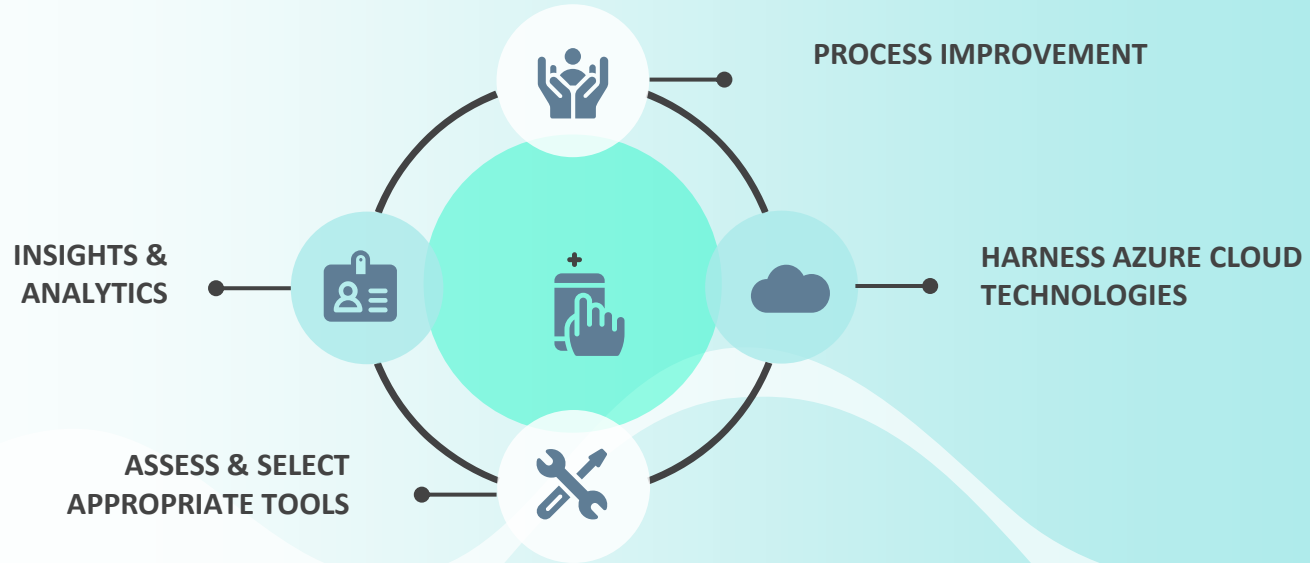


**ML model scales well to  
large data corpus**



**Screening tool to cut  
down operational time**

# DIGITAL TRANSFORMATION STRATEGY



# PHASES OF DIGITAL TRANSFORMATION



**ASSESSMENT**



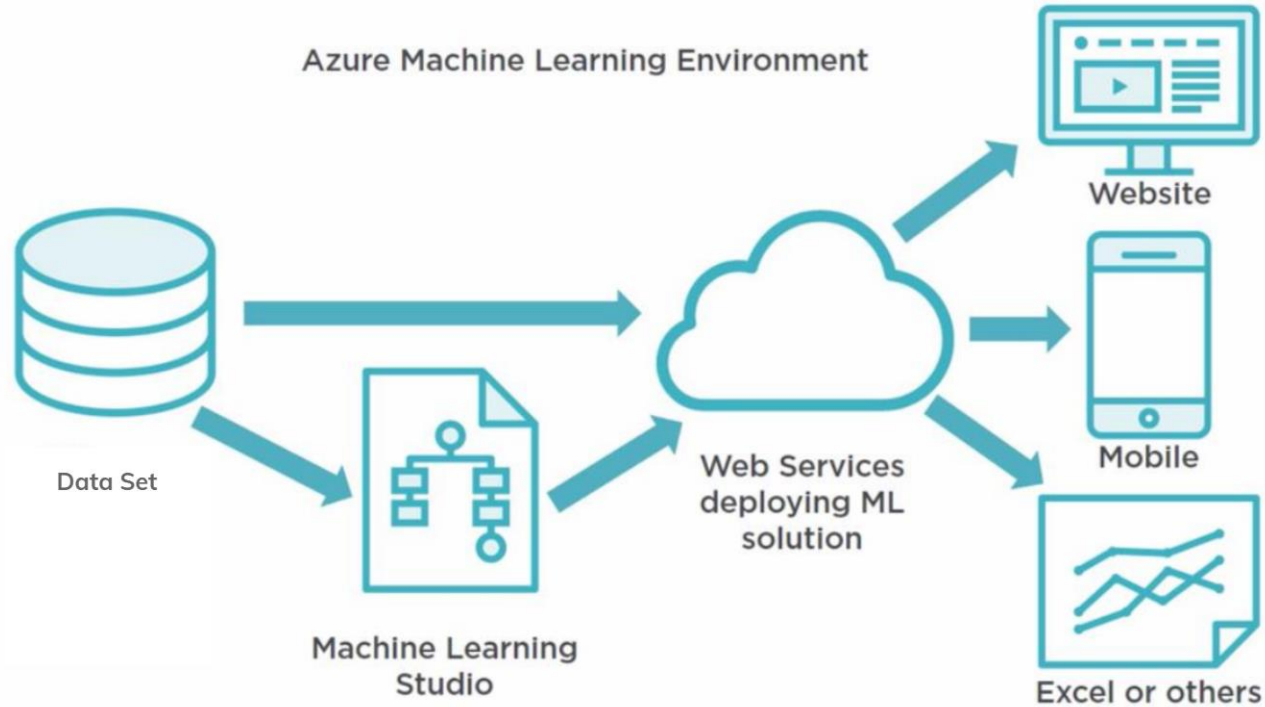
**EXPERIMENTATION**



**IMPLEMENTATION**



# SOLUTION DESIGN

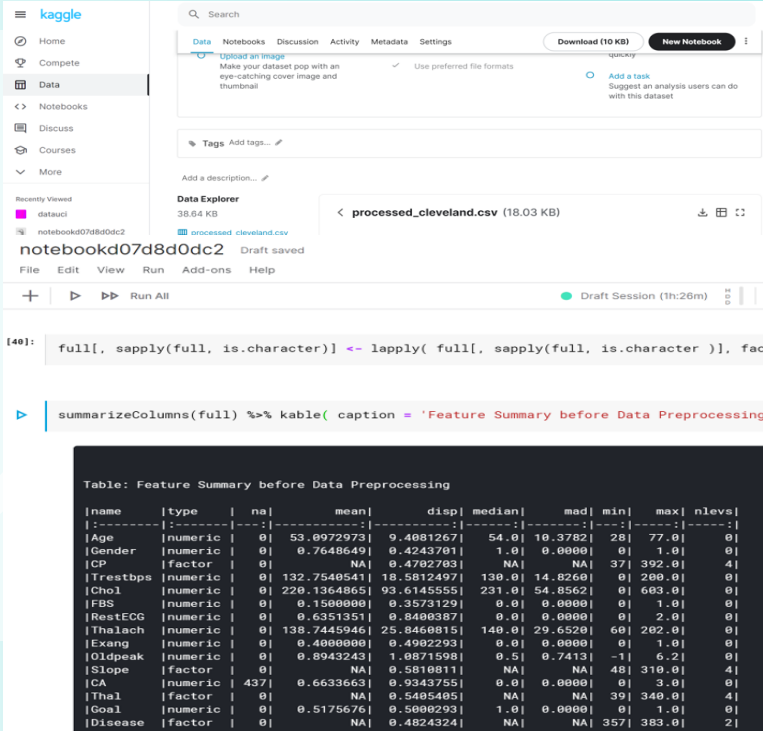


# METHODOLOGY - PART 1

Data Manipulation in Kaggle notebook using R language

The raw dataset contains 76 attributes, but we will be using a subset of 14 of them.

Finalized the parameters that needs to be trained



The screenshot displays a Kaggle notebook environment. The left sidebar shows the notebook's file structure, including a dataset named 'processed\_cleveland.csv' (18.03 KB) and a notebook titled 'notebookd07d8d0dc2'. The main area shows R code being executed in a cell. The code defines a 'full' dataset and uses 'kable()' to generate a summary table of the data before preprocessing. The output is a table with columns: name, type, na, mean, disp, median, mad, min, max, nlevs. The table lists various features like Age, Gender, CP, Frestbps, Chol, FBS, RestECG, Thalach, Exang, Oldpeak, Slope, CA, Thal, Goal, and Disease, along with their respective statistics.

```
[40]: full[, apply(full, is.character)] <- lapply( full[, apply(full, is.character )], fac

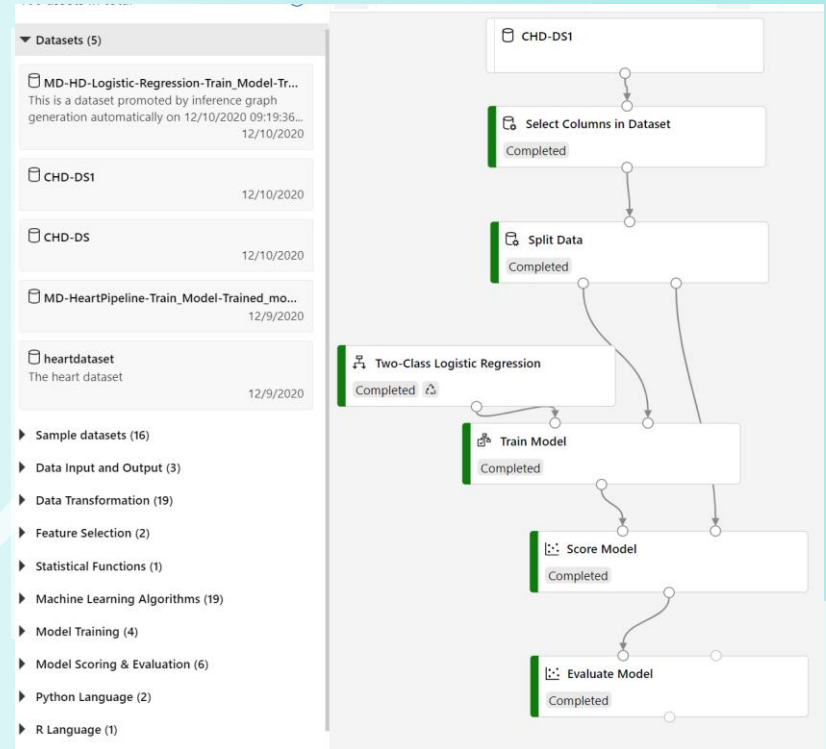
> summarizeColumns(full) %>% kable( caption = 'Feature Summary before Data Preprocessing
```

[name	[type	[ na	mean	disp	median	mad	min	max	nlevs
[Age	[numeric	[ 0	53.0972973	9.4081267	54.0	10.3782	28	77.0	0
[Gender	[numeric	[ 0	0.7648649	0.4243701	1.0	0.0000	0	1.0	0
[CP	[factor	[ 0	NA	0.4702709	NA	NA	37	392.0	4
[Frestbps	[numeric	[ 0	132.7540541	18.5312497	130.0	14.8260	0	200.0	0
[Chol	[numeric	[ 0	220.1364865	93.6145555	231.0	54.8562	0	603.0	0
[FBS	[numeric	[ 0	0.1500000	0.3573129	0.0	0.0000	0	1.0	0
[RestECG	[numeric	[ 0	0.6351351	0.8400387	0.0	0.0000	0	2.0	0
[Thalach	[numeric	[ 0	138.7445946	25.8460815	140.0	29.6520	60	202.0	0
[Exang	[numeric	[ 0	0.4000000	0.4902293	0.0	0.0000	0	1.0	0
[Oldpeak	[numeric	[ 0	0.8943243	1.0071590	0.5	0.7413	-1	6.2	0
[Slope	[factor	[ 0	NA	0.5810811	NA	NA	48	319.0	4
[CA	[numeric	[ 437	0.6633663	0.9343755	0.0	0.0000	0	3.0	0
[Thal	[factor	[ 0	NA	0.5405405	NA	NA	39	340.0	4
[Goal	[numeric	[ 0	0.5175676	0.5000293	1.0	0.0000	0	1.0	0
[Disease	[factor	[ 0	NA	0.4824324	NA	NA	357	383.0	2

# METHODOLOGY - PART 2

Building the Machine Learning model

Deploy it as a web service



# METHODOLOGY - PART 3 Final Web Output

Input a patient's information

Output indicates if the patient is at a higher risk for heart disease

```
string exang = txtexang.Text;
string oldpeak = txtoldpeak.Text;
string slope = txtslope.Text;
string ca = txtca.Text;
string thal = txtthal.Text;
string target = txttarget.Text;

string result = InvokeRequestResponseService(age, sex, cp, trestbps, chol, fbs, restecg, thalach, exang, oldpeak, slope, ca, thal, target);
string[] resultOutput = result.Split(',');
lblscopePoint.Text = resultOutput[resultOutput.Count() - 2];
lblSecondOutPut.Text = resultOutput[resultOutput.Count() - 1];
var score = lblSecondOutPut.Text.Replace("Scored Probabilities");
lblriskpoint.Text = float.Parse(score) > 0.5 ? "HIGH" : "LOW";
}

[reference]
static async Task<string> InvokeRequestResponseService(string age, string sex, string cp, string trestbps, string chol, string fbs, string restecg, string thalach, string exang, string oldpeak, string slope, string ca, string thal, string target)
{
    var handler = new HttpClientHandler()
    {
        ClientCertificateOptions = ClientCertificateOption.Manual,
        ServerCertificateCustomValidationCallback = (httpRequestMessage, cert, cetChain, policyErrors) => { return true; }
    };
    using (var client = new HttpClient(handler))
    {
        var scoreRequest = new
        {
            Inputs = new Dictionary<string, List<Dictionary<string, string>>>() {
                {
                    "WebServiceInput0",
                    new List<Dictionary<string, string>>() {
                        new Dictionary<string, string>() {
                            { "age", age },
                            { "sex", sex },
                            { "cp", cp },
                            { "trestbps", trestbps },
                            { "chol", chol },
                            { "fbs", fbs },
                        }
                    }
                }
            }
        };

        string result = client.PostAsJsonAsync("https://demoscoring.azurewebsites.net/Score", scoreRequest).Result.Content.ReadAsStringAsync().Result;
    }
}
```

Application name Home About Contact

Age:	63
Sex:	1
cp:	3
trestbps:	145
chol:	233
fbs:	1
restecg:	0
thalach:	150
exang:	0
oldpeak:	2.3
slope:	0
ca:	0
thal:	1
target:	1

GetScore Clear Input

Score Generated by this model"Scored Labels": 1.0  
Score Generated by this model"Scored Probabilities": 0.7553041129865138]]]]  
Risk HIGH

# DEMO

<https://demoscureapp.azurewebsites.net>

Click - Recorded Demo Video



# LIMITATIONS AND CONSTRAINTS

- ❖ Training model built on a limited size dataset
- ❖ Making sure HIPAA regulations are followed and data remains secure
- ❖ Potential resistance from internal stakeholders
- ❖ Buy in from patients



THANKS  
&  
QUESTIONS