



Innovation Centre

Delivering smarter IT solutions for your business

PREDICTIVE INCIDENT MANAGEMENT

BUSINESS CHALLENGES

- Handling large number of ITSM tickets [Volume affects the ticket routing, prioritizing and resolution]
- High volume of incidents results in increased MTTR, risking SLA compliance and customer satisfaction
- How to proactively prevent or minimize a service outage?
- How to predict an impact of an incident?
- How to mitigate the risks of change-related incidents?
- How to Predict incidents on environmental change?

SOLUTION

Utilising the Machine Learning algorithms, data analysis methods to create a solution that is capable of

- Incident type identification
- Resolution time prediction
- Predicting a potential problem on a new change (change risk prediction)
- Predicting incidents on environmental change
- Predicting possibility of a change failure
- Root Cause Analysis

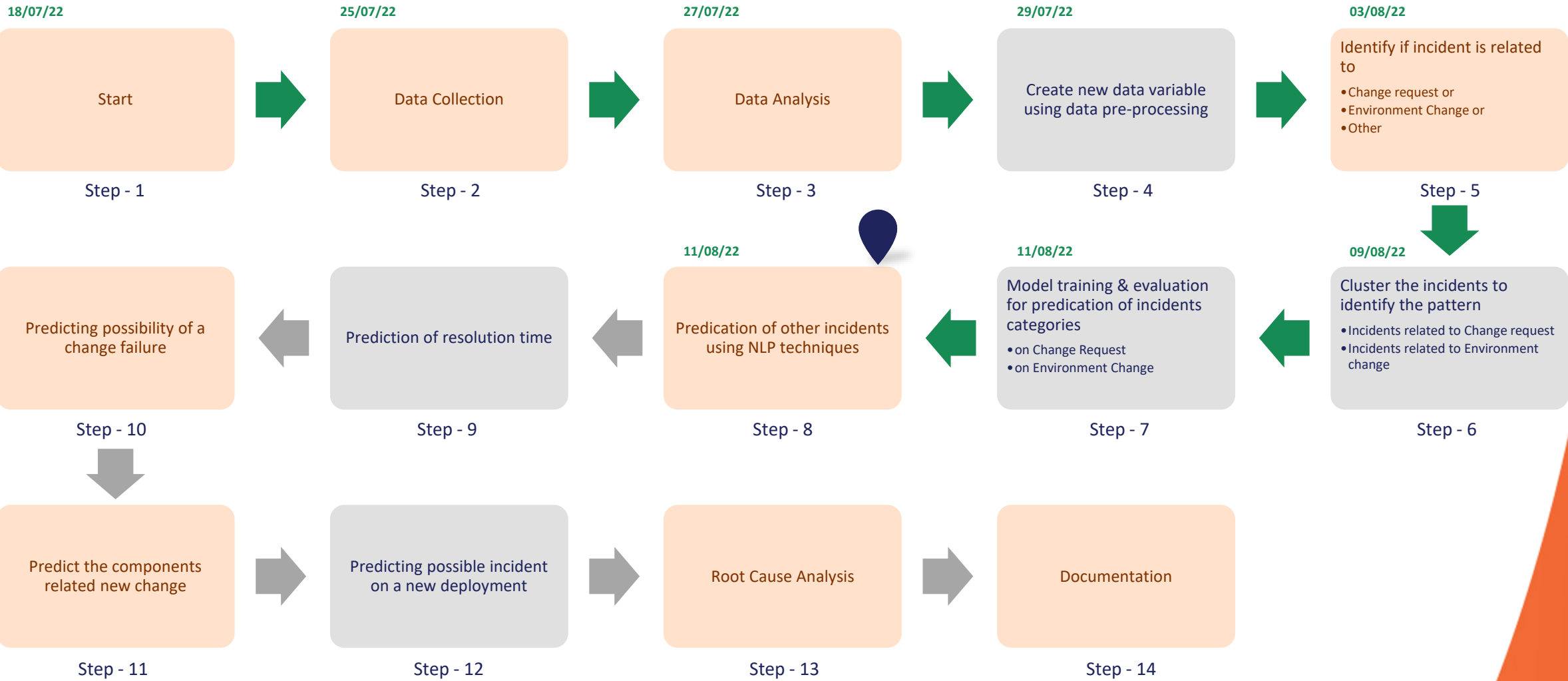
PREDICTIVE INCIDENT MANAGEMENT

BENEFITS

- **Faster MTTR** (Mean Time To Resolution) : Automatic Ticket routing based on incident types; root cause analysis will help to improve MTTR
- This will be acting as a catalyst between operations and the ticketing management system. It will help you to organize your incident management in a better way.
- **Increased Productivity** : The models will also help to find the root cause of incidents, so the amount of time spent by the L1,L2 team will drastically reduced , they can be utilized for other things
- **Reactive to Proactive Approach** : Incident prediction on change request failure, or environment change will help to fix the issues before it become system wide incidents.
- It will help you to make better business decisions. Then you can take a call on which area to focus on.

	Incident Type	Count
0	Service request incidents	16524
1	Capacity Incidents	11392
2	Network incidents	130
3	DBA Incidents	94
4	DB Incidents	90
5	SQL Maintainence Incidents	34
6	Cloud maintenance incidents	27

PROCESS FLOW

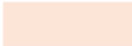


RAW DATA

Sr. No	Fields	Type	Details
1	Number	String	Alpha Numeric
2	Updated	Date	Date & Time
3	Active	String	Category
4	Assigned to	String	User Name
5	Assignment group	String	Category
6	Business duration	Int	Number
7	Affected User	String	User Name
8	Closed	Date	Date & Time
9	Closed By	String	User Name
10	Created	Date	Date & Time
11	Created by	String	User Name
12	Description	String	
13	Domain	String	Category
14	Duration	Int	Number
15	Impact	String	Category
16	Incident Type	String	Category
17	Incident state	String	Category
18	Made SLA	String	Category
19	Requester	String	User Name
20	Resolve time	Date	Date & Time
21	State	String	Category



Sr. No	Fields	Type	Details
3	Active	String	Category
10	Created	Date	Date & Time
12	Description	String	
13	Domain	String	Category
15	Impact	String	Category
16	Incident Type	String	Category
17	Incident state	String	Category
18	Made SLA	String	Category



No change in values



No or less information



Personal Identification Information & Date



Not Available for New Tickets

LIBRARIES USED



NLTK



DATA PRE-PROCESSING

Libraries used: Regex, NLTK and Stanford NER Library



NLTK



Pre-processing steps:

- Analysis was done in which we removed Null values.
- Data type conversion (object to string for description column as it is textual data)
- Removal of personal info such as email-id, employee id and contact number from description column using regex library
- Extracting relevant information for incidents from Description column after identifying the patterns.
- Cleaned the textual data by applying the NLP technique using NLTK library

Username: Mackey Mi\nEmployee/Agent ID: TEMP\nEmail Address: MMcoiu@world.com\nContact Number: 1234563984\nNew or Existing Issue: New \nRemote or Office based user: remote\nIs the issue for yourself or being raised on behalf of someone else? Self\nHardware or Software issue: Software \nServer Name: n/a \nProblem: Cisco jabber performance issue

Description from Raw Data



Username Employee Agent ID TEMP Email Address:
Contact Number: New Existing Issue: New Remote
Office based user: remote Is issue being raised behalf
Self Hardware Software issue: Software Server Name:
Problem: Cisco jabber performance issue

Cleaned Description



Cisco jabber performance
issue

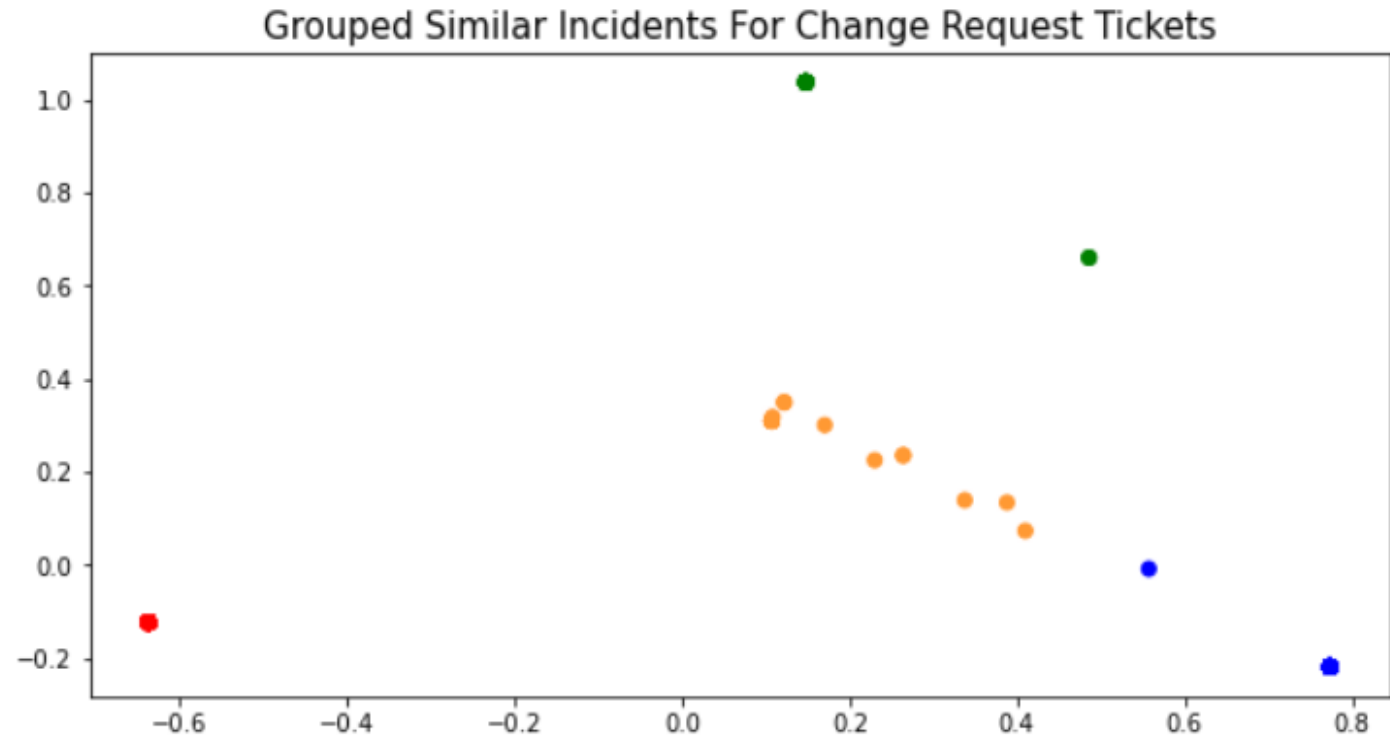
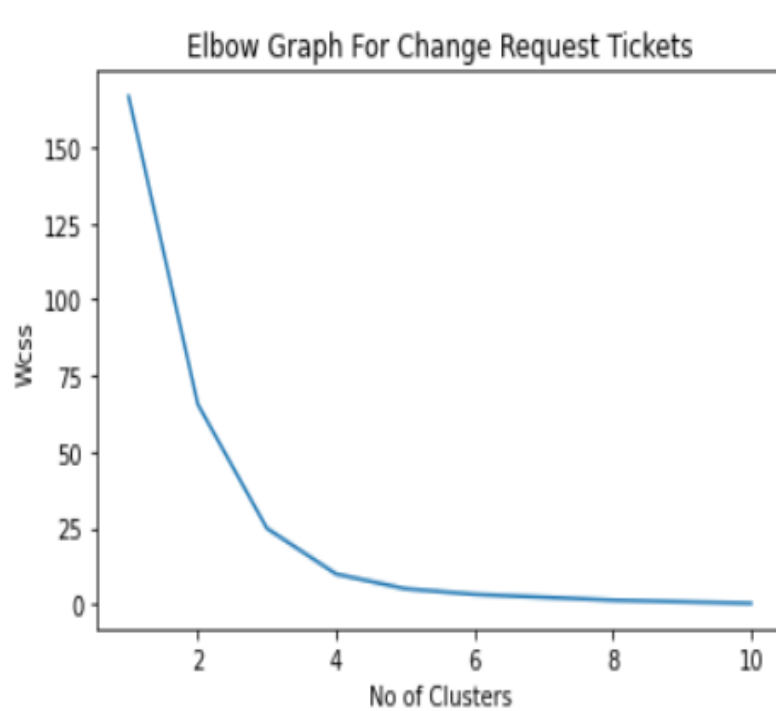
Cleaned Short Description

IS CHANGE REQUEST?

- Collected set of keywords related to change request and identified incident tickets by passing set of keywords on description column.
- Vectorizing the change request tickets by providing vocabulary which consists of change request keywords.

CLUSTERING

Grouping the change request tickets to get its incident types with K-Mean clustering algorithms and chosen number of clusters 4 using Elbow plot.



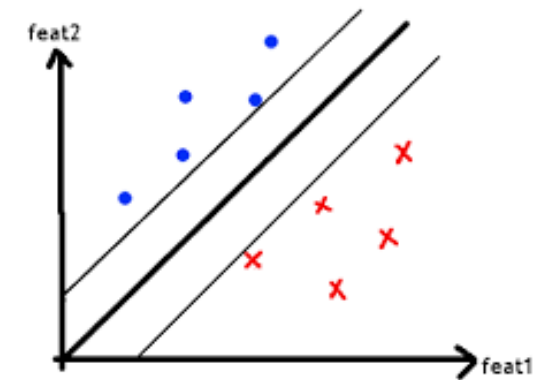
- Cloud Maintenance Incident
- Network Incident
- Capacity Incident
- User Service Request Incident

MODELS RESULT

Built set of 4 classification models with 5-fold cross validation and fitted on train data.

Finalised the LinearSVC model with 98% accuracy and saved the model using pickle.

	Mean Accuracy	Max Accuracy
model_name		
DecisionTreeClassifier	0.985965	1.000000
LinearSVC	0.989474	1.000000
MultinomialNB	0.912281	0.929825
RandomForestClassifier	0.982456	1.000000



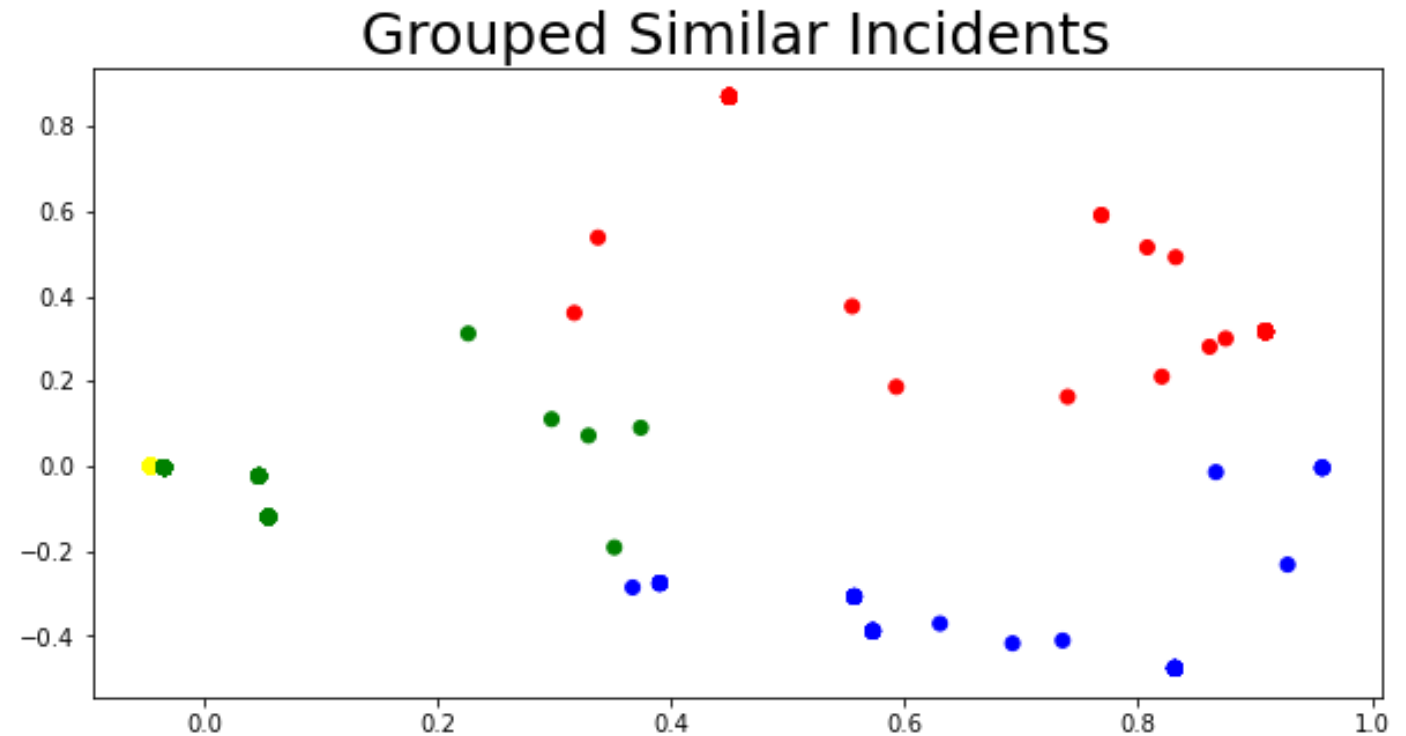
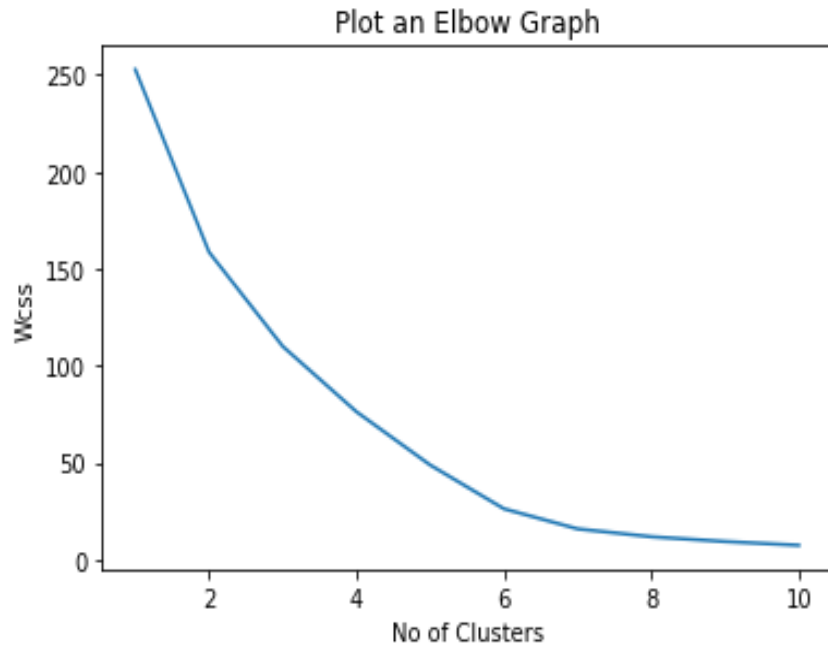
Linear Support Vector Classifier

IS ENVIRONMENTAL CHANGE?

- Collected set of keywords related to environment change and identified incident tickets by passing set of keywords on description column.
- Vectorizing the environmental change tickets by providing vocabulary which consists of Environmental change related keywords.

CLUSTERING

Grouping the environment change tickets to get its incident types with K-Mean clustering algorithms and chosen number of clusters 4 using Elbow plot.



● Capacity Incident

● DB Incident

● DBA Incident

● SQL Maintenance Incident

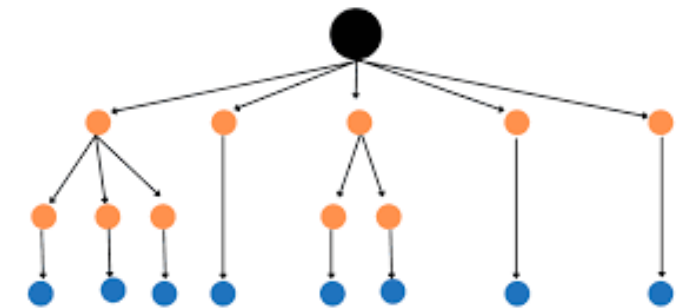


MODELS RESULT

Built set of 5 classification models with 5-fold cross validation and fitted on train data.

Finalized the DecisionTreeClassifier model with 99% accuracy and saved the model using pickle

	Mean Accuracy	Max Accuracy
model_name		
DecisionTreeClassifier	0.998751	1.00000
KNeighborsClassifier	0.998501	1.00000
LinearSVC	0.999251	1.00000
MultinomialNB	0.952547	0.96005
RandomForestClassifier	0.998002	1.00000



Decision Tree Classifier

PREDICTIONS RESULTS

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DEVELOPMENT IN PROGRESS

- Impact of Environment change
- Predict change request failure
- Predict the resolution time



PREDICTIVE INCIDENT MANAGEMENT

BENEFITS

- **Key Benefits for Customer :**
 - Improved Uptime & performance of Applications
 - Increased reliability of services
 - Improved Customer satisfaction and experience
- **Key Benefits for Business :**
 - Saved man-hours on IT operations, resulting in reduced IT operations costs
 - An increase in the efficiency and productivity of IT personnel
 - Resolving IT problems faster
 - A more predictable IT environment





THANK YOU

