Predicting Incident Management Service Level Agreement (SLA) Failures

Capstone Task 3 – Presentation

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Agenda

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Introduction

Carolyn M. Hennings

ITIL® Expert

Project Management Professional®

Professional Experience

IT Strategy

Business Analysis

Performance Improvement

IT Service Management

Problem Statement

Incident Management

Minimize the duration of interruptions in normal service operations while also minimizing the impact of those interruptions (Hanna, 2011)

What factors predict Incident Management SLA compliance?

Service Level Agreements

Describe services and establish service level targets as negotiated and agreed upon between the service provider and the customer (Hanna, 2011)

Can a logistic regression model predict incidents likely to breach an SLA?

SLA Compliance

Resolve incidents within agreed timeframes

Hypotheses

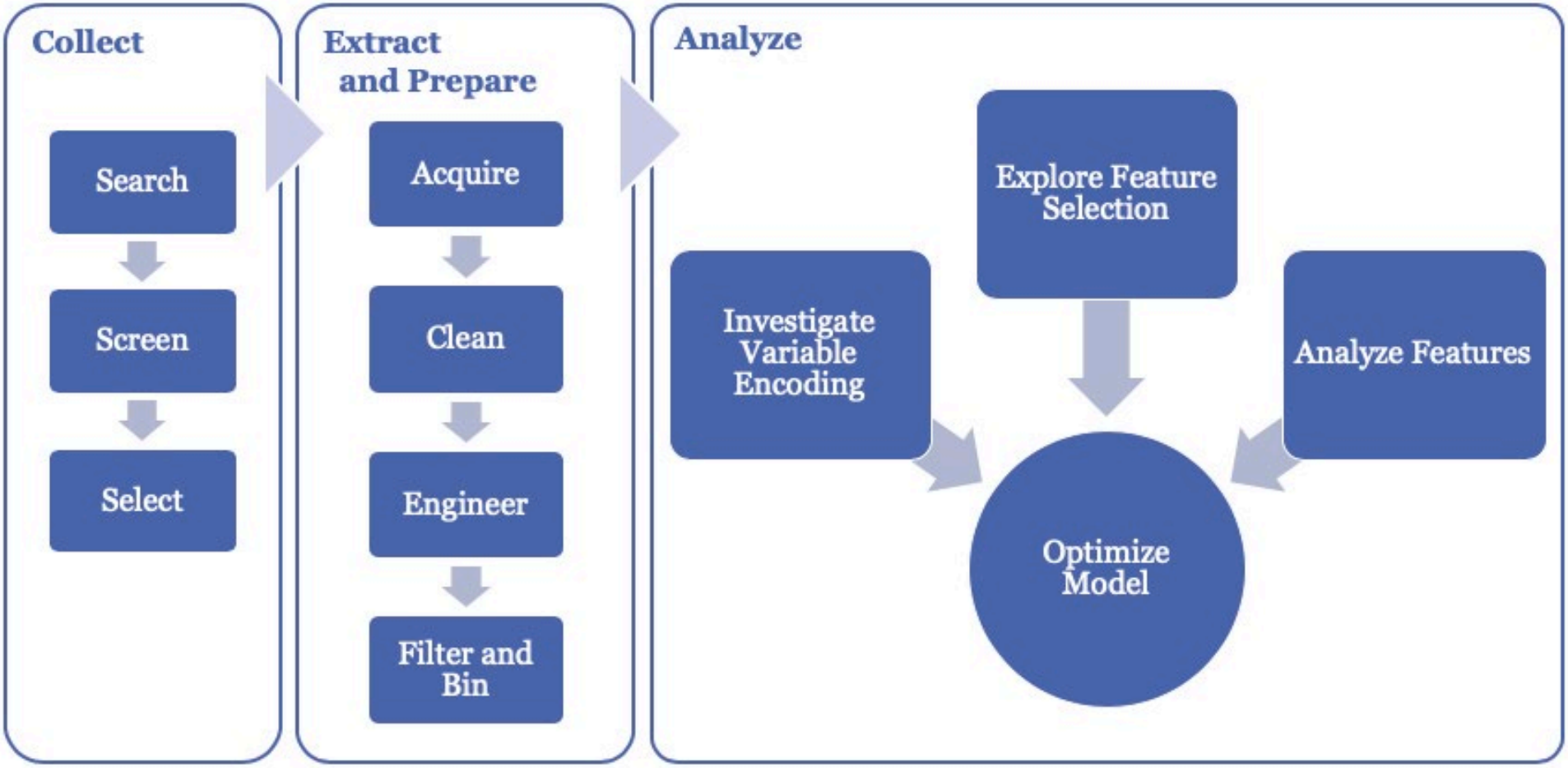
Non-zero coefficients in a logistic model indicate factors contributing to SLA compliance

Formal Definition

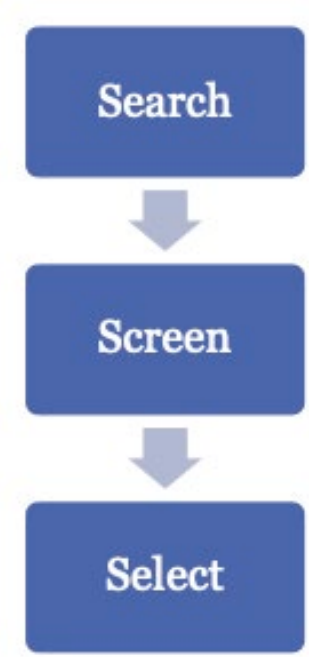
H_0: Data contains no significant indicators about the final SLA status of an incident (the coefficients of a logistic regression model are zero, $\beta_i = 0$)

H_1: Data contains significant indicators about the final SLA status of an incident (the coefficients of a logistic regression model are not zero, $\beta_i \neq 0$)

Data Analysis Process



Collect



Internet search of publicly available data sets

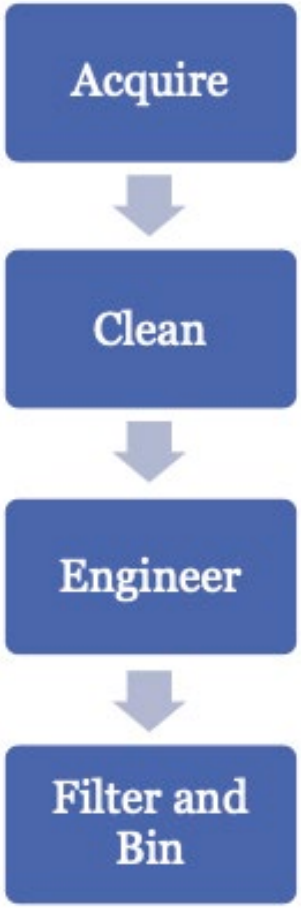
Considered

– UCI Machine Learning Repository Incident management process enriched event log Data Set (Amaral et al., 2019)

Selected

– *2014 Business Processing Intelligence Challenge (BPIC) Incident Records file (Van Dongen, 2014)*

Extract and Prepare



Engineer the Target Variable (SLAFail)

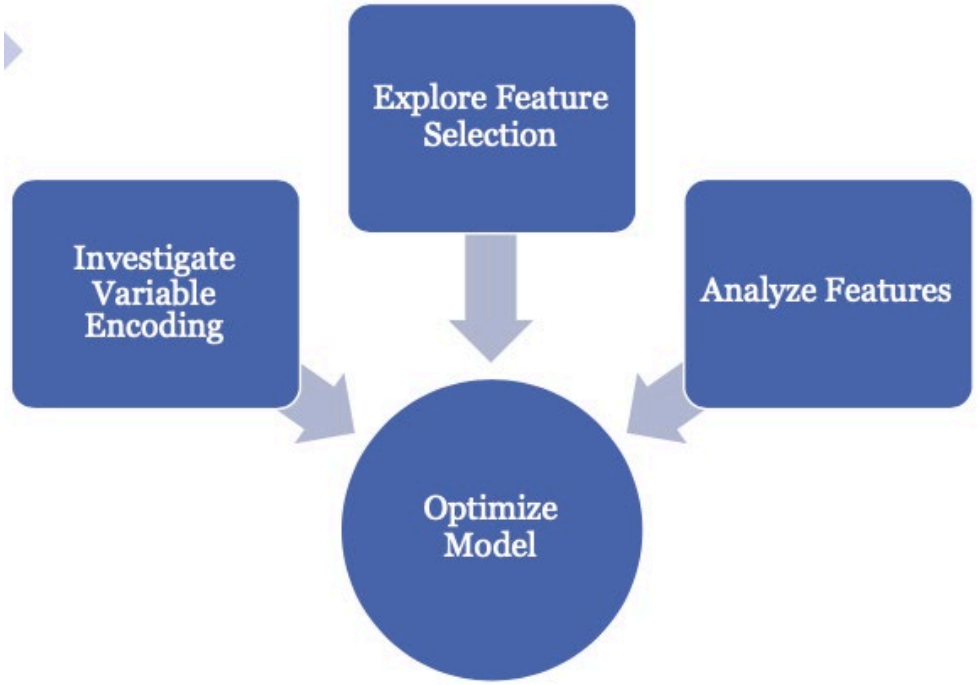
Priority	Time Between Opened and Resolved
1 Very High	Greater than 240 minutes (4 hours)
2 High	Greater than 480 (8 hours)
3 Medium	Greater than 1440 (1 day)
4 Low	Greater than 2880 (2 days)
5 Very Low	Greater than 5760 (4 days)

Analyze

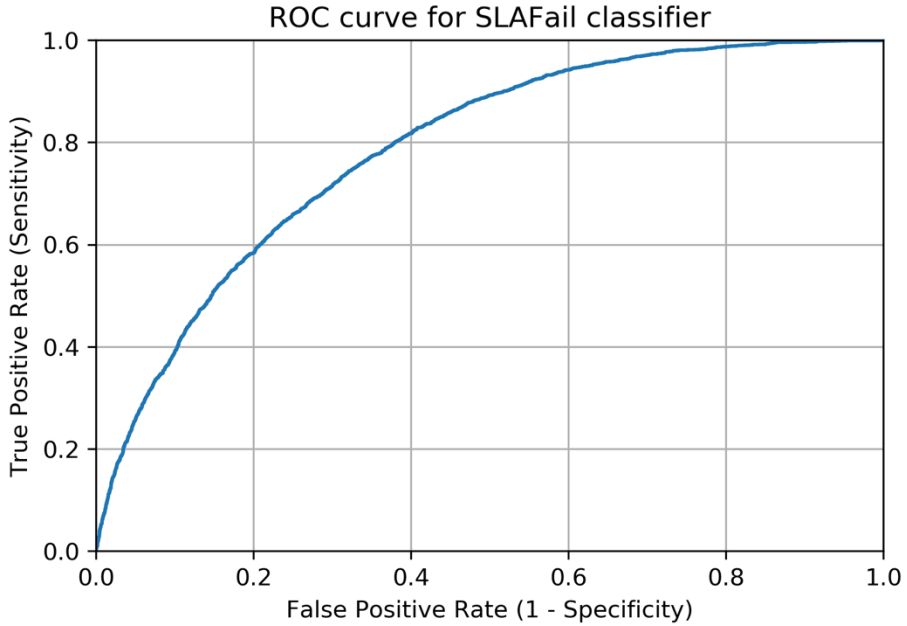
Evaluation Criteria

Classification Accuracy

Accuracy: 75%		Predicted	
		0	1
Actual	0	TN: 6597	FP: 848
	1	FN: 1827	TP: 1291



Area Under the Curve (AUC)



Findings

P-values < 0.05 indicate statistically significant coefficients

Variable	Coefficient	F score	P-value
Service_Component_WBS_aff	0.1040	141.5840	0.0000
Urgency	0.1881	6104.4400	0.0000
KM_number	1.1217	177.7560	0.0000
Count_Related_Interactions	1.1726	679.7630	0.0000
Count_Related_Incidents	1.2459	902.1090	0.0000
Count_Related_Changes	0.0388	62.0758	0.0000
Open_Time_HourOfDay	0.1824	5.6072	0.0179
Open_Time_DayOfWeek	-0.0358	0.3519	0.5530

Accept the Null Hypothesis

– The data contains significant indicators of final SLA status

However:

– Best model achieved 78% classification accuracy

– Null Accuracy resides at 70%

Limitations of Techniques and Tools

	Benefits	Limitations
Feature Selection	Identification of most discriminatory factors	Required manipulation of data types through encoding of categorical variables and standardization of numeric variables
Factor Analysis		
Logistic Regression Model	Appropriate and industry accepted technique for classifying binary response variables	
Python	Cost effective programming language with extensive data analytics capabilities	Computing resource requirements

Proposed Actions

Observation	Recommendation
Configuration Items and Knowledge Articles appeared as strong indicators of SLA breaches	Investigate specific Configuration Items and Knowledge Articles that significantly contribute to SLA breaches
Limited data about categories of Knowledge Articles and impacted users	Collect additional data for inclusion in the model
Logistic Regression provided only slightly better results	Consider other classifier techniques such as decision trees, support vector machines (SVM), or *k* nearest neighbors

Benefits

Role	Benefit
Service Desk Agents	– Swift identification of incidents requiring prioritized attention
Incident Managers	– Ability to make resource allocation decisions – Reduction of incident duration
Customers	– Increased availability of services

Increased Customer Satisfaction

Summary

Exploratory Study

Mixed Results:

- Hypothesis accepted
- Marginal value

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