Business Analysis of Bars on Yelp

2019 Fall STAT 628 Group 2

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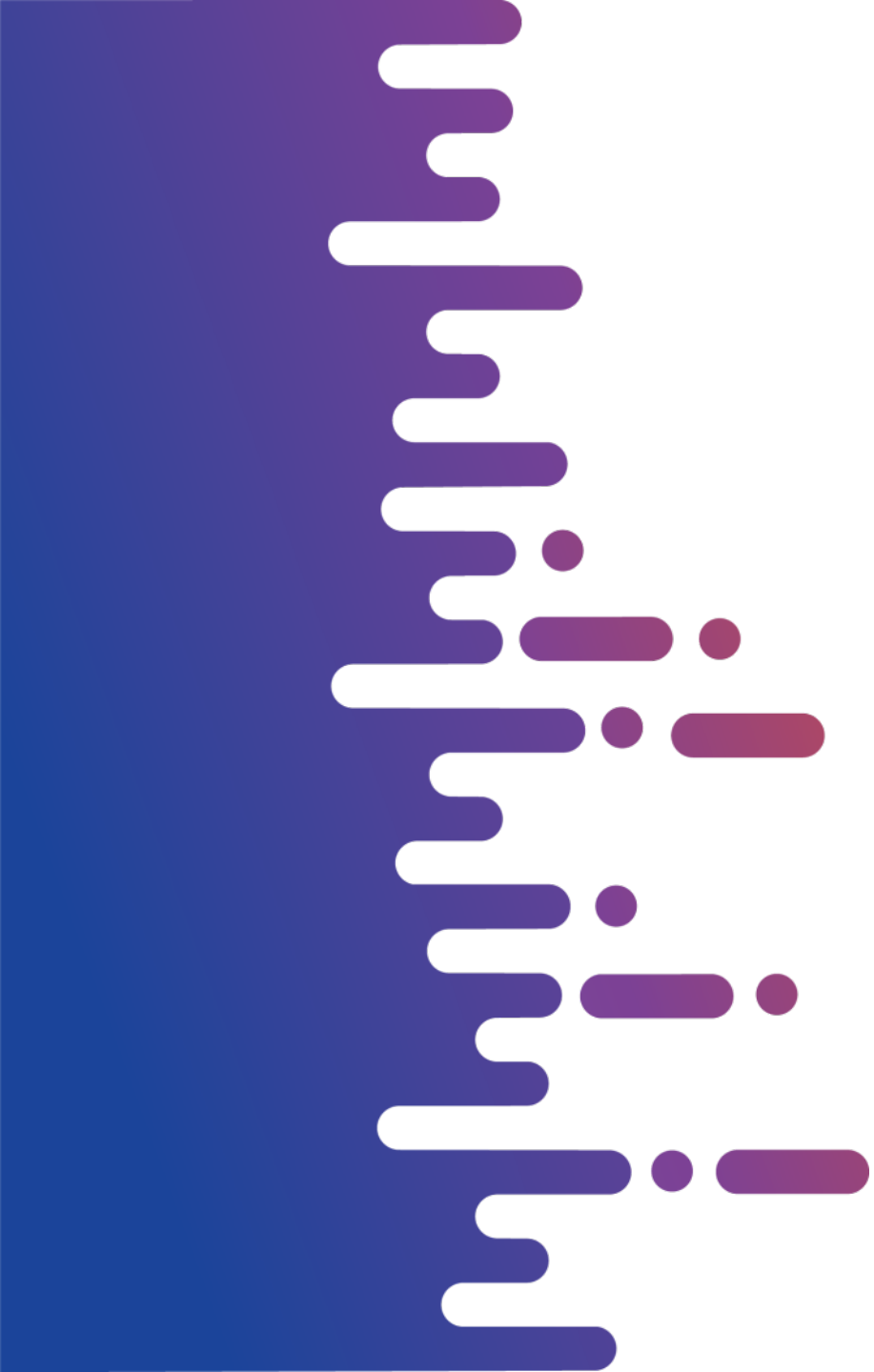


1 . Overview

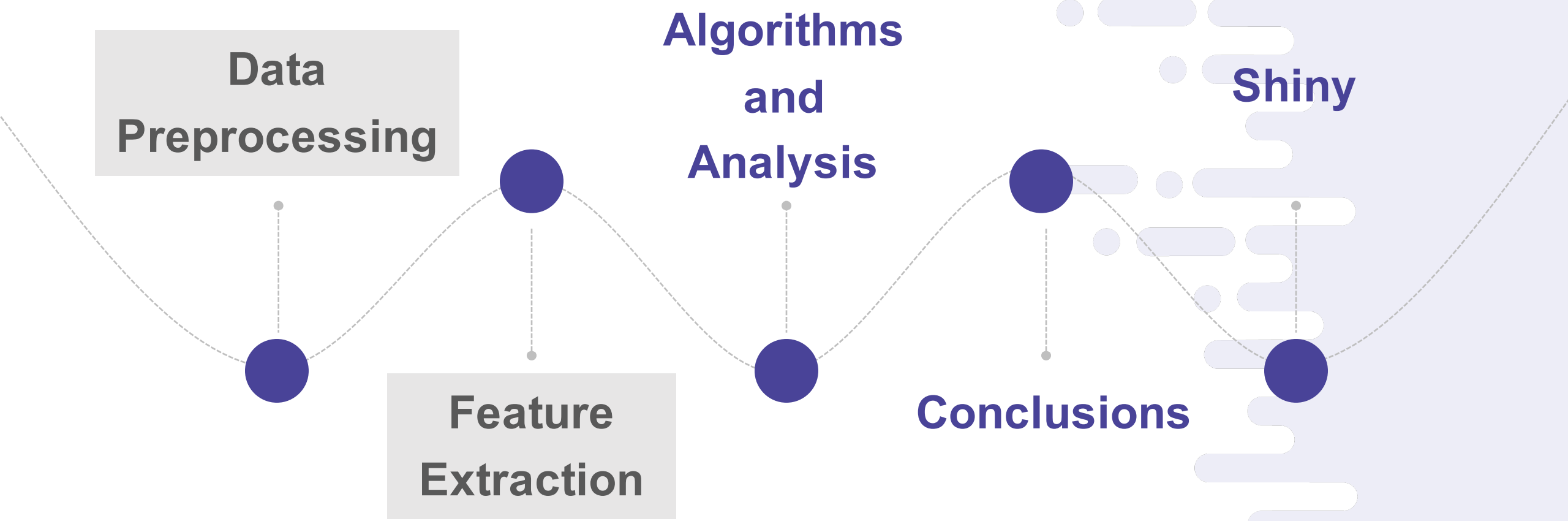
2 . Algorithms and Analysis

3 . Shiny App

PART 01

Overview

Overview——Workflow



Overview——Models

TF-IDF

Logistic Regression

Topic Model

Score Model

01 General Suggestions

02 Food Service Environment

Conclusions

Strength

User information.

Rank the business by state.

Comprehensive and customized advice.

Weakness

No topic model for VA and WA

Inaccuracy

PART 02

Algorithms and Analysis

Algorithms and Analysis

Generalized Linear Regression

Business Attributes

Topic Model

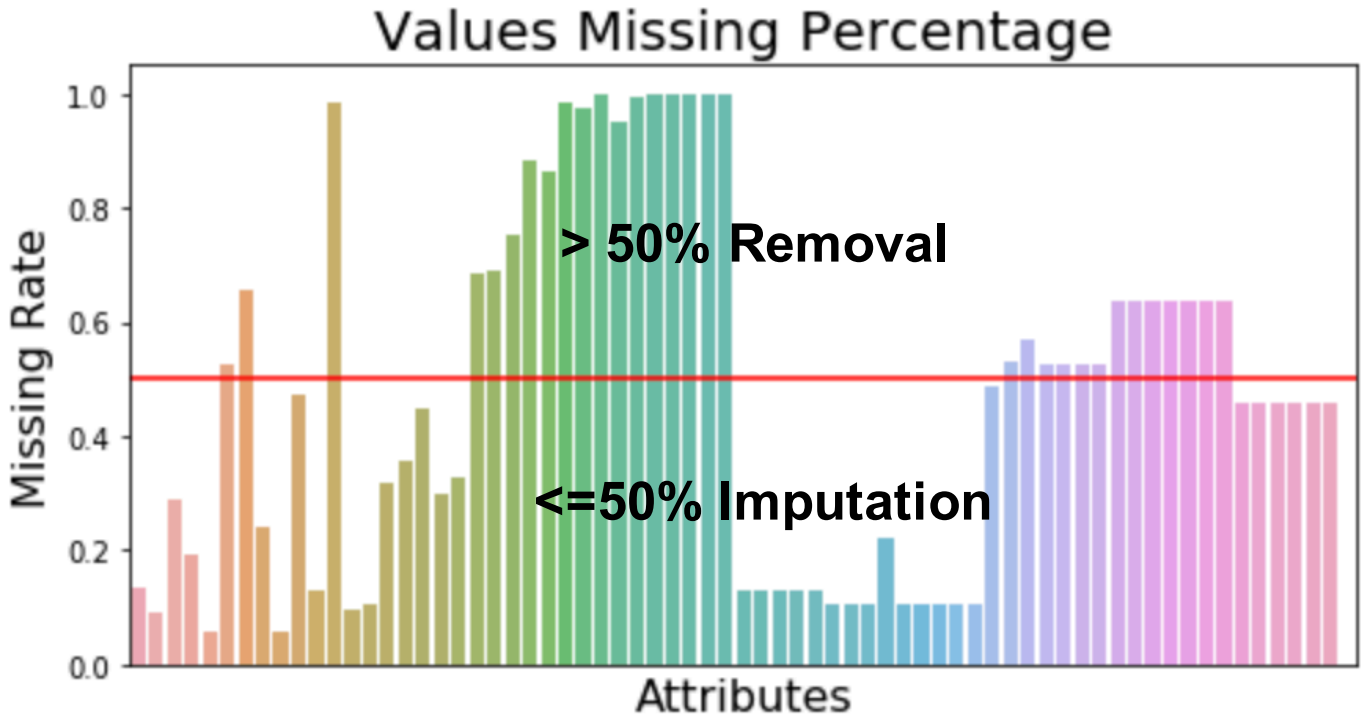
Non-negative Matrix Factorization

Score Model

User Efficiency

Algorithms and Analysis——Logistic Regression

Missing Value in Business Attributes

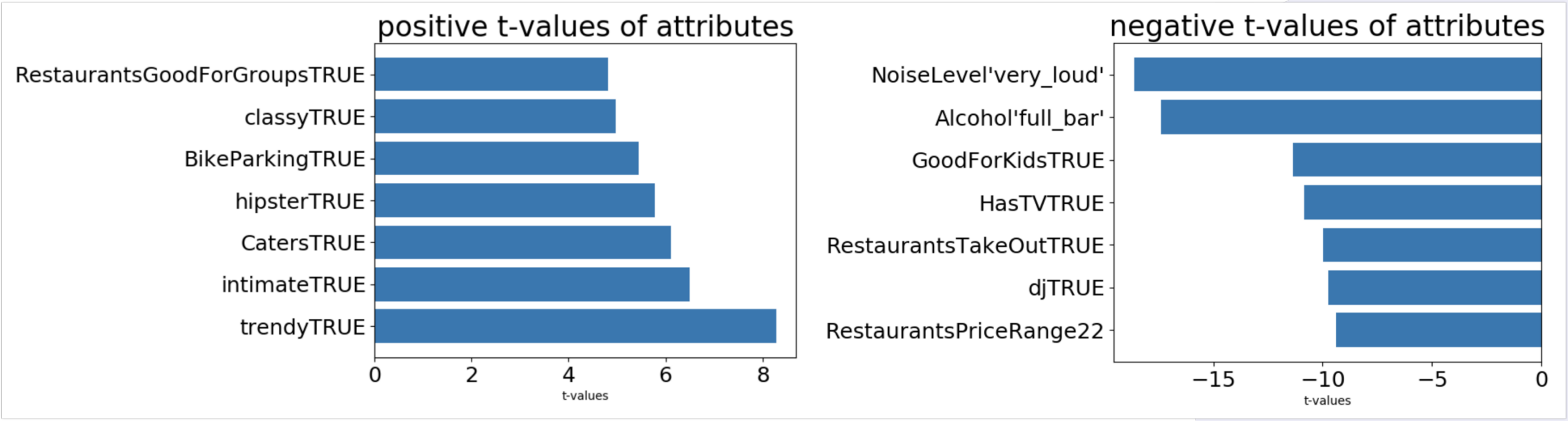


Imputation formula

$$\sqrt{\frac{mean((X-\hat{X})^2)}{\mathrm{var}(X)}}$$

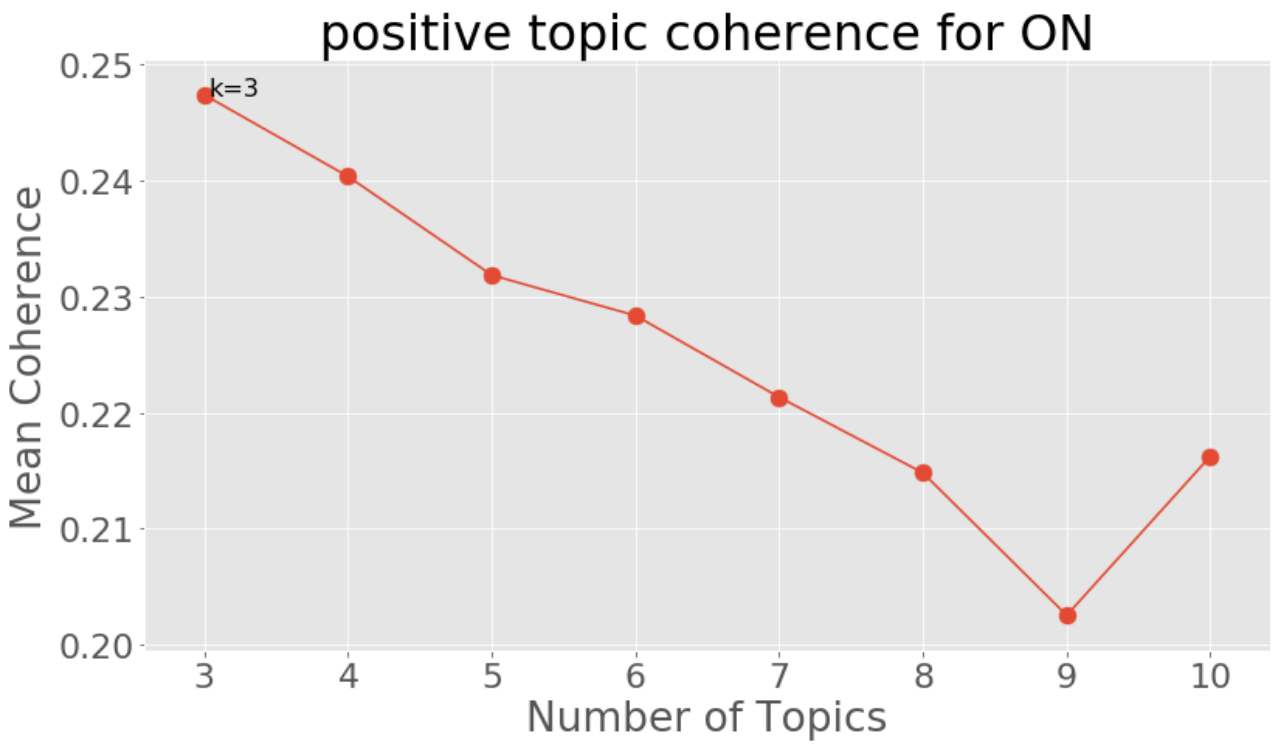
Algorithms and Analysis——Logistic Regression

Business Attributes

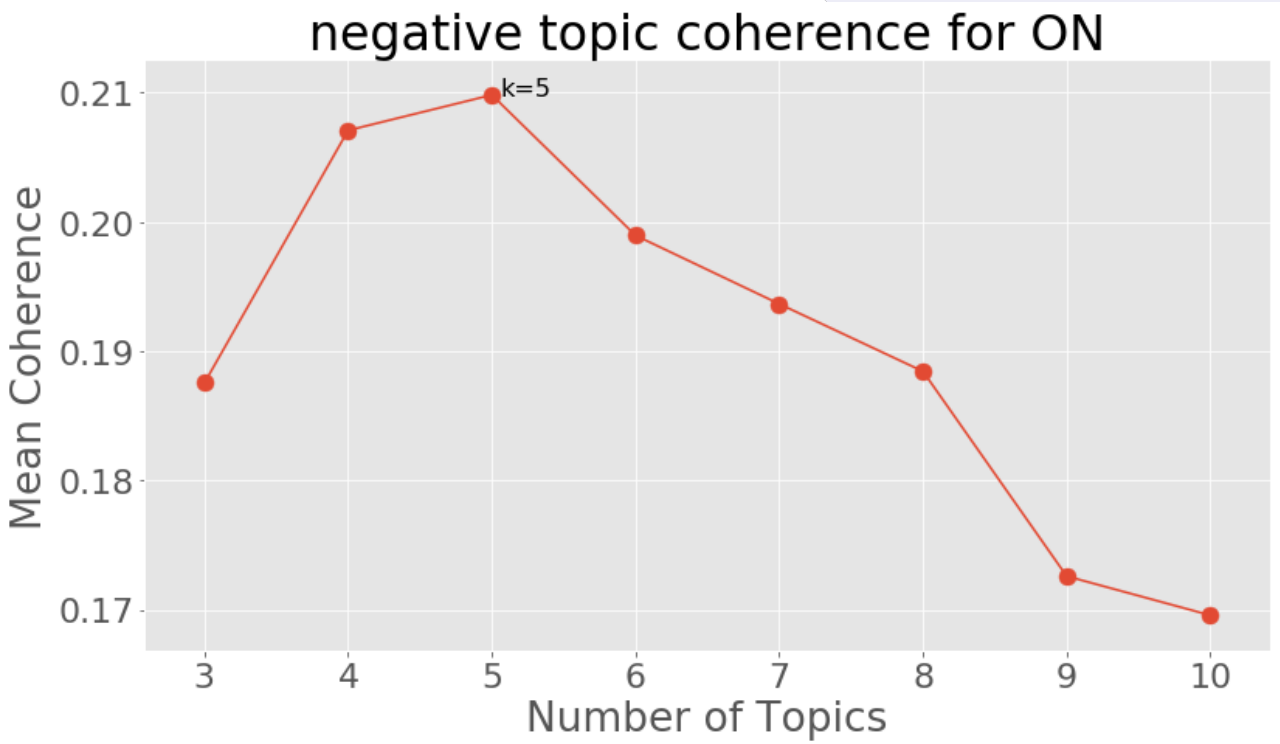


Algorithms and Analysis——Topic Model

Ontario in Canada



K=3



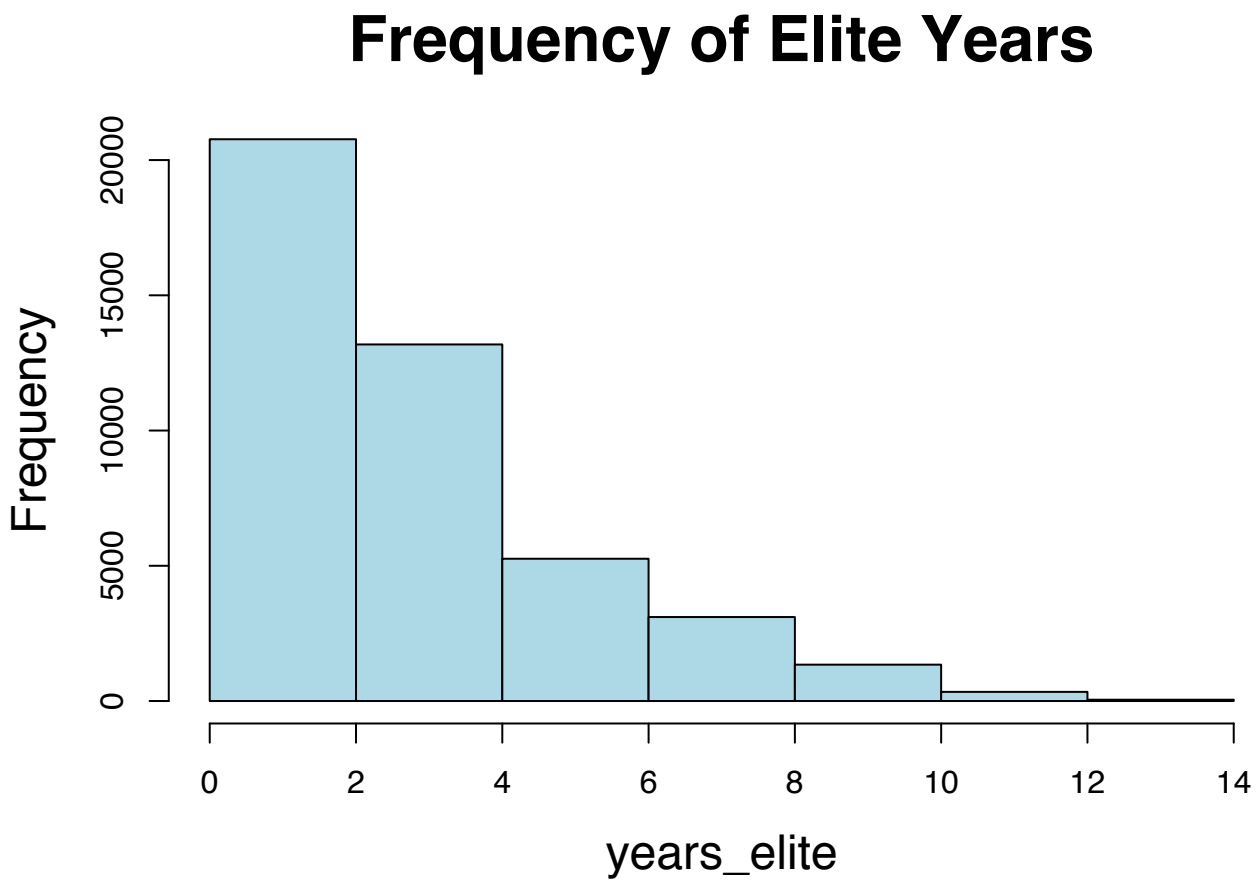
K=5

Algorithms and Analysis——Topic Model

Positive Topic	Words
Environment	drink, bar, night, beer, table, look, menu
Service	time, service, amaze, experience, staff, friendly, recommend
Food	dish, fry, sauce, chicken, taste, menu, delicious

Negative Topic	Words
Table Availability	table, wait, minutes, seat, sit, host, ask
Service Time	time, service, wait, experience, staff, slow, long
Food Flavor	fry, taste, chicken, dish, menu, wing, sauce
Bartender Proficiency	drink, bar, beer, night, look, friends, bartender
Service Quality	ask, server, tell, bill, manager, leave, waitress

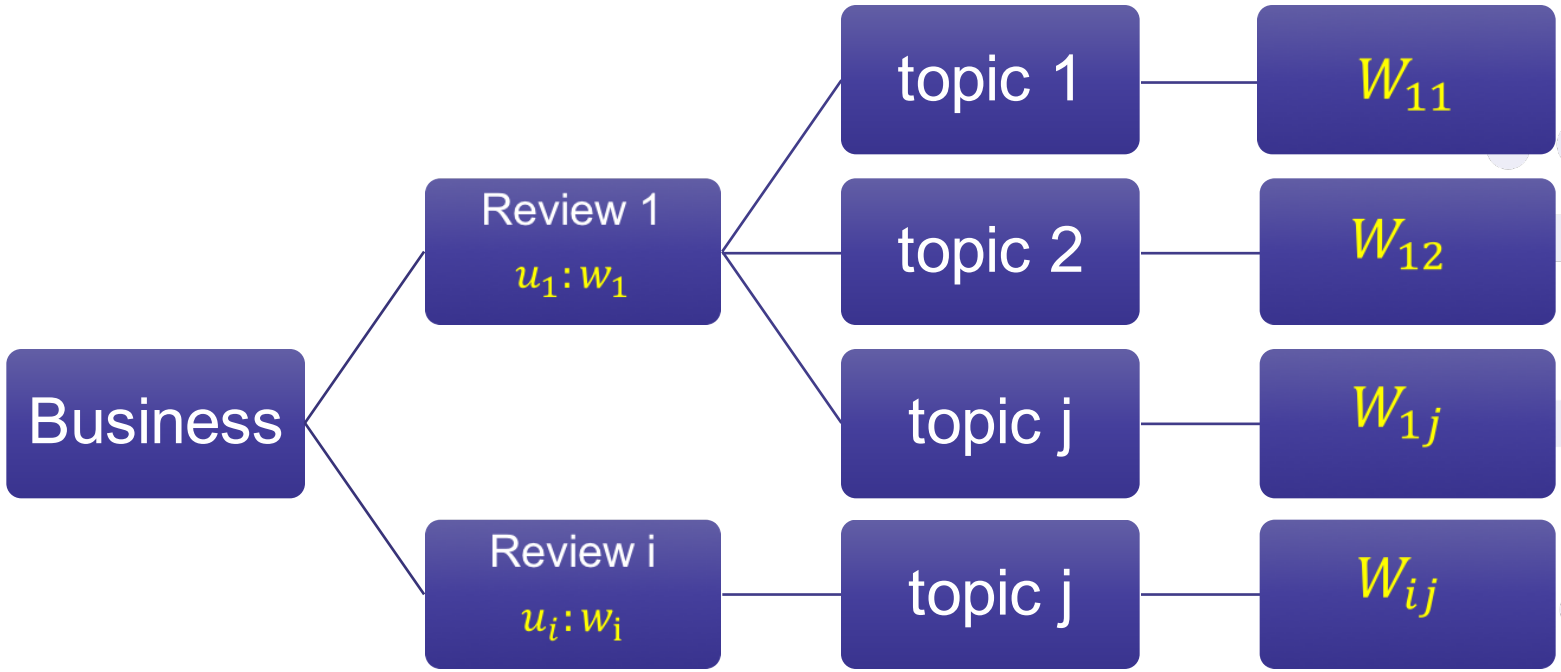
Algorithms and Analysis——User Efficiency



Elite Years	User Weight
0	1
1	1.1
2	1.2
3	1.3
4	1.4
5	1.5
6	1.6
7	1.7
8	1.8
9	1.9
10	2.0
11	2.1
12	2.2

Algorithms and Analysis——Score Model

$$Business\ topic_j\ score = \frac{\sum_{i=1}^{n}\sum_{j=1}^{m} W_{user_i} * Score_{topic_i^j}}{\sum_{i=1}^{n} W_{user_i}}$$



Algorithms and Analysis——Score Model

	Words	Category
Topic 1	table, wait, minutes, ask, time, service, minutes, waitress	Place
Topic 2	drink, bar, night, beer, bartender, pay, leave	Service
Topic 3	fry, taste, chicken, dish, menu, service, burger	Menu

Business Name	State	Topic 1 Place Rank	Topic 2 Service Rank	Topic 3 Menu Rank
Sparrow	QC	66%	55%	**71%**

Provide specialty on menu.

Special sauce for wings.

Change fryer oil frequently.

PART 03

Shiny App

https://ylingbfcalculator.shinyapps.io/Yelp_data_analysis/

Thank you for watching

Presented by group 2