EPPS 6323 Research Presentation

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Table of Contents

1 Introduction

2 Literature Review

3 Research Design

4 Results

5 Conclusion

1 Introduction

Why should we be concerned about job satisfaction among public sector workers?

- Job satisfaction tends to correlate with positive outcomes such as increased productivity, life satisfaction, and retention among workers (Judge et. al., 2001; Judge & Watanabe, 1985; Corwin, 2002)
- Compared to other private workplaces, public service workers tend to have dissimilar rates of job satisfaction despite engaging in similar work (Emmert & Tamer, 1992).

1 Introduction

Why utilize machine learning techniques?

Machine learning techniques are techniques that allow computers to gather data without explicit instructions (Jain et. al., 2020).

- Job satisfaction is a complicated variable, with previous models utilizing up to 400 different variables to measure it (Holgado-Apaza et. al., 2023).

- Utilizing machine learning techniques allows us to gather and analyze such data in an in-depth and multidimensional manner almost impossible through conventional means (Kang et. al., 2021).

2 Literature Review

- Job satisfaction

– many factors organizational characteristics, attitudes in the workplace, pay, age (Wright and Davis, 2003; Rainey, 2009; Monyan and Pandey, 2007; Naff and Crum, 1999; Vroom, 1964).

– across sectors (Chen, 2018; Lee and Sabharwal, 2016), countries (Chordiya, Sabharwal, and Goodman, 2017; Chordiya, Sabharwal, and Battaglio, 2018), in one single country (Lee et al., 2020; Chordiya, Sabharwal, and Goodman, 2017)

– many studies using this factor as a dependent variable among federal employees

 (Sabharwal, 2013; Choi, 2013; Vanderschuere and Birdsall, 2019; Lee, Robertson, and Kim, 2020; Fernandez, Resh, Moldogaziev, and Oberfield, 2015)

- However, little consistent evidence on determinants of job satisfaction

2 Literature Review

- Executive Order 14035 (President Biden) focuses on diversity, equity, inclusion, and accessibility (DEIA) is significant

- Related studies about diversity programs (Choi, 2008; Choi and Rainey, 2014; Pitts, 2009).

- Less explored how DEIA affects job satisfaction

- Perceptions about DEIA have been surveyed among federal employees since 2022's Federal Employee Viewpoint Survey (FEVS).

- This study aims to include a wide range of factors related to DEIA, race, and gender, and examine which determinants influence job satisfaction.

3 Research Design

- 2022 Federal Employee Viewpoint Survey (FEVS)

- Conducted by the U.S. Office of Personnel Management

- Individual-level data, Primary data source

- Perceptions of federal employees using a 5-point Likert scale

- 99 items used in this study

- This study uses this average score to quantitatively assess the level of job satisfaction

3 Research Design

Target Variable

- Job Satisfaction

- 5-point Likert scale

- 6 Survey questions

- This study uses this average score to quantitatively assess the level of job satisfaction

3 Research Design

Work Experience

#13

Workplace Flexibilities

#10

Work Unit

#20

Employee Experience

#5

Feature Variables

Organization

*#1*0

DEIA

#14

Supervisor

#10

Leadership

#10
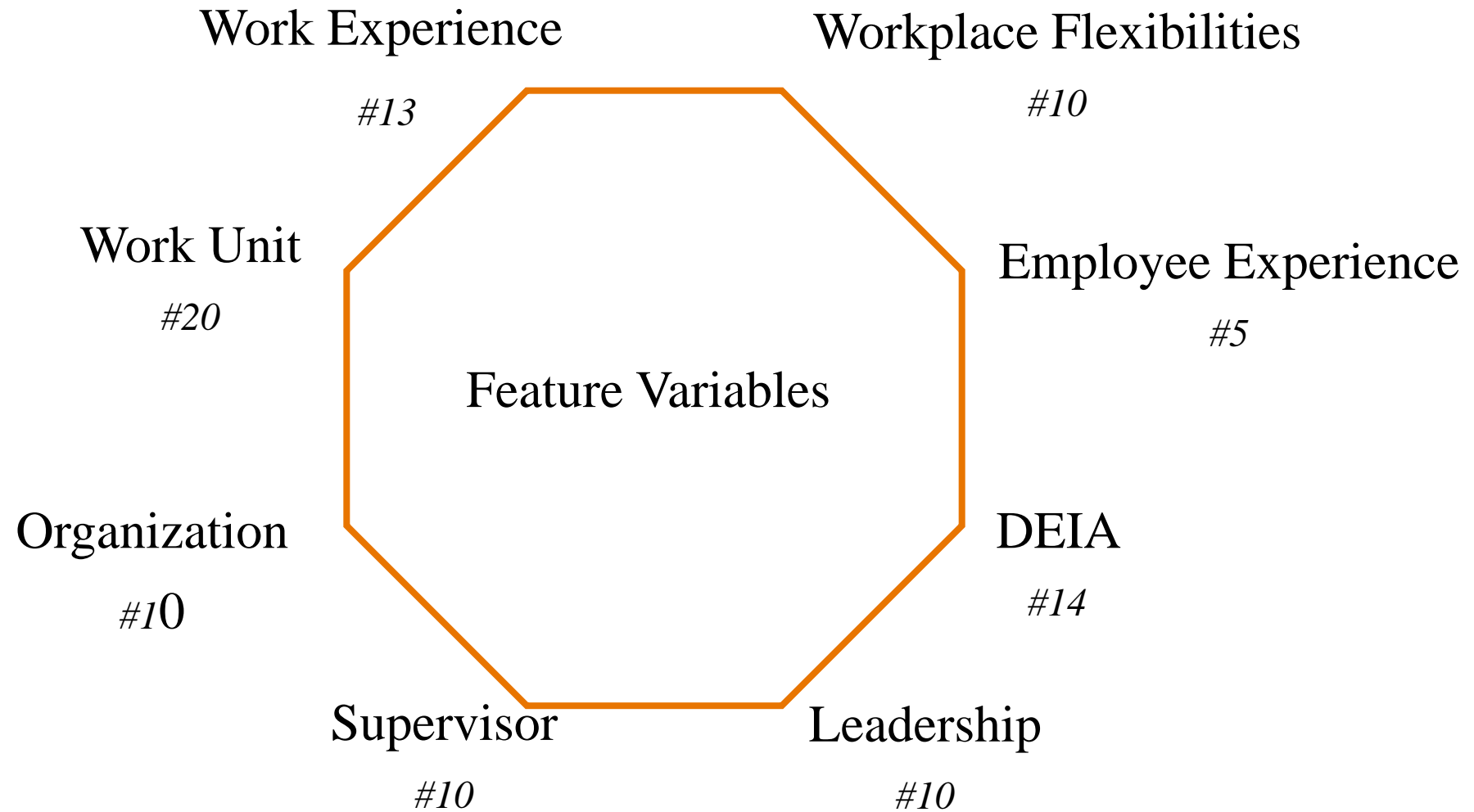
Step 1

Race/Gender	Majority	Non-Majority
Male	Majority: Male	Non-Majority: Male
Female	Majority: Female	Non-Majority: Female

Research Design

Step 2

Disability Group

Race/Gender	Majority	Non-Majority
Male	Majority: Male	Non-Majority: Male
Female	Majority: Female	Non-Majority: Female

4 Results

Table 1. Results of Descriptive Analysis

		Total	Majority: Male (%)	Majority: Female (%)	non-Majority: Male (%)	non-Majority: Female (%)
Gender	Male	90,223	66,312(73.5)	0	23,911(26.5)	0
	Female	73,163	0	4,7021(64.3)	0	26,142(35.7)
Race	African American	20,799	0	0	8,446(40.6)	12,353(59.4)
	White	113,801	66,312(58.3)	47,489(41.7)	0	0
	Asian	9,672	0	0	5,249(54.3)	4,423(48.2)
	Other Groups	10,243	0	0	5,303(51.8)	4,940(48.2)
Age	Under 40	38,551	14,177(36.8)	13,140(34.1)	4,940(12.8)	6,294(16.3)
	40 or Older	124,943	52,122(41.7)	34,246(27.4)	18,337(14.7)	20,238(16.2)
Disability	# of disability	25,380	10,959(43.2)	5,736(22.6)	4,872(19.2)	3,813(15.0)
Status	# of Supervisor	117,496	43,586(37.1)	34,427(29.3)	16,485(14.0)	22,998(15.0)

4 Results

Figure 1. Boxplot against Job Satisfaction by Group
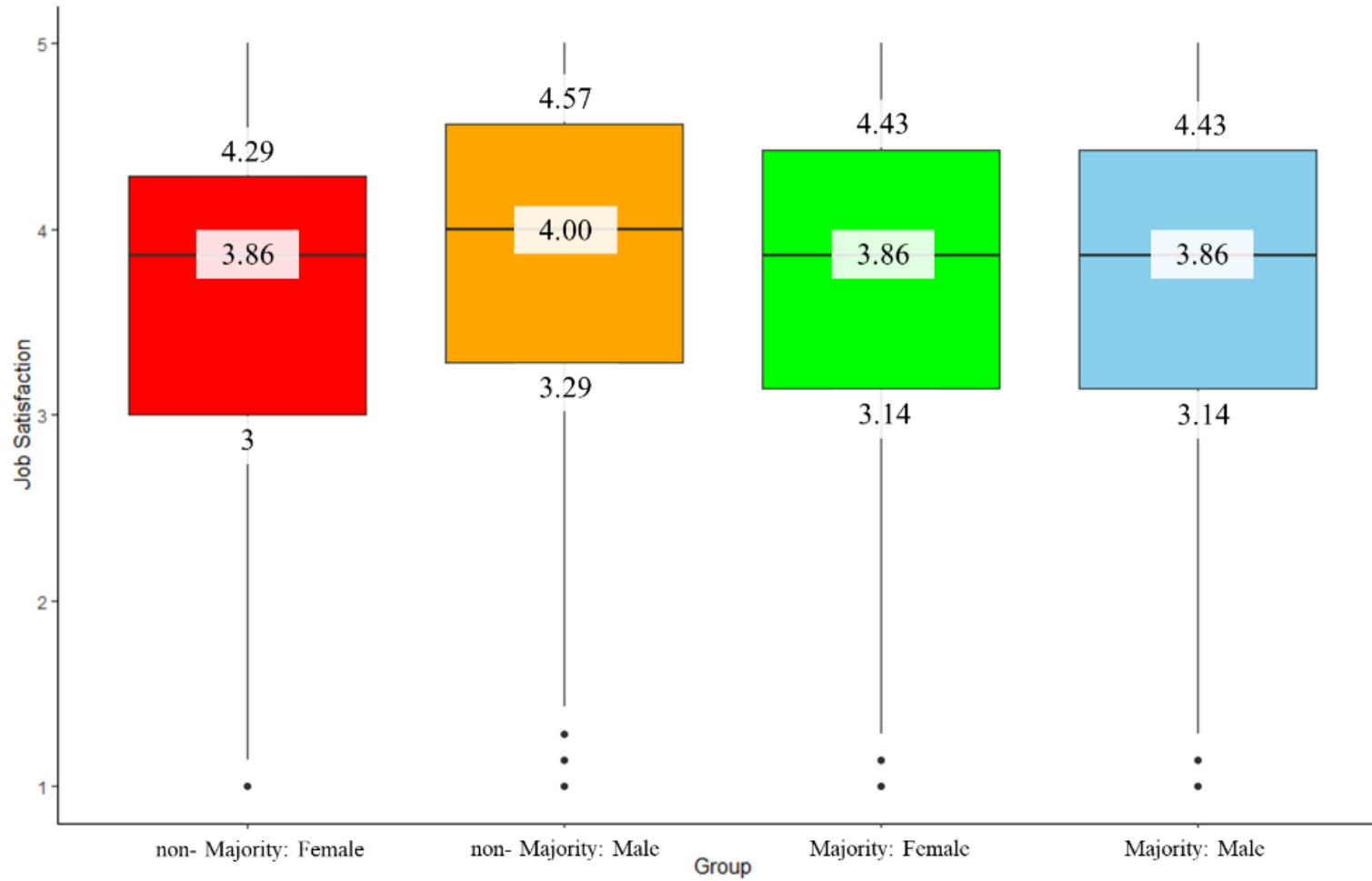
4 Results

Figure 2. Decision tree for job satisfaction of total respondents
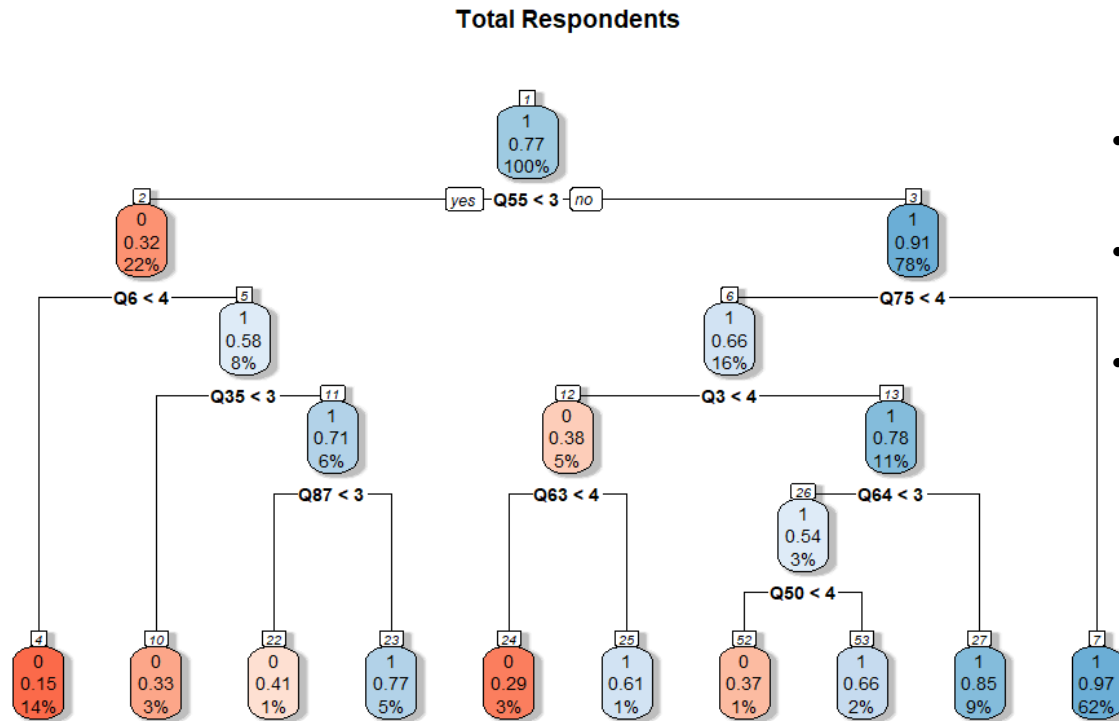
- Q55 (Leadership): My organization's leaders inspire motivation and commitment.

- Q6 (Work Experience): My talents are used well in the workplace.

- Q75 (DEIA): All employees recognized equally for excellent work.

Accuracy:0.899 / Sensitivity:0.9306 / Specificity:0.7857

Results

Figure 3. Decision tree for job satisfaction by Group

Majority: Male

- Leadership
- Work Experience
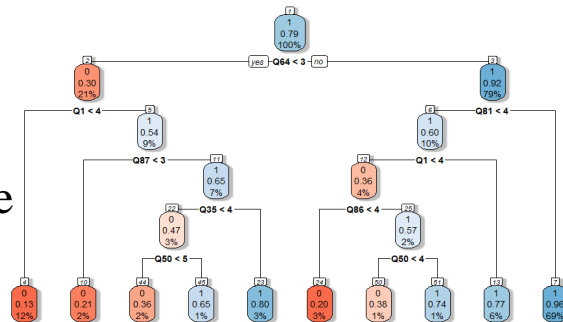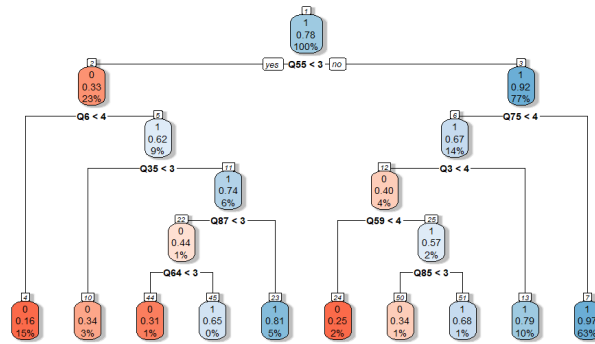- DEIA
- Organization
- Employee Experience

Results

Figure 3. Decision tree for job satisfaction by Group

Majority: Male
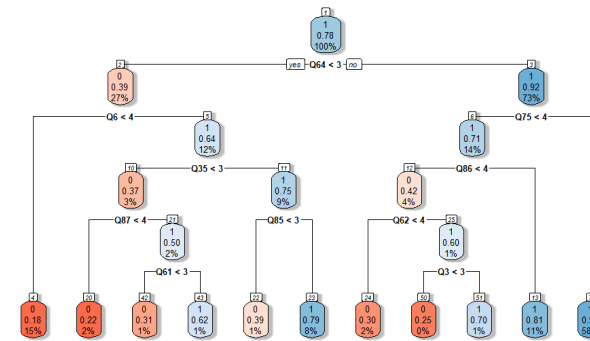
Majority: Female

- Leadership
- Work Experience
- DEIA
- Organization
- Employee Experience

- Leadership
- Work Experience
- Organization
- DEIA
- Employee Experience

4 Results

Figure 3. Decision tree for job satisfaction by Group

Majority: Male

- Leadership
- Work Experience
- DEIA
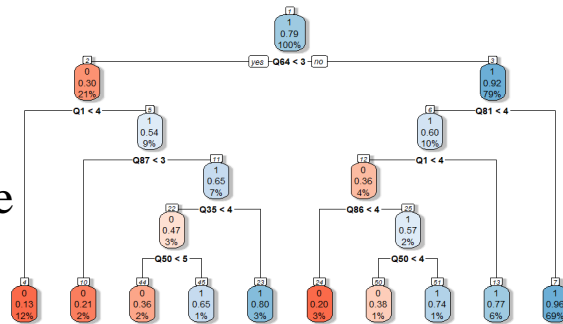- Organization
- Employee Experience

Majority: Female

- Leadership
- Work Experience
- Organization
- DEIA
- Employee Experience

Non-Majority: Male

- Leadership
- Work Experience
- Employee Experience
- Organization

Figure 3. Decision tree for job satisfaction by Group

Majority: Male

- Leadership
- Work Experience
- DEIA
- Organization
- Employee Experience

Majority: Female

- Leadership
- Work Experience
- Organization
- DEIA
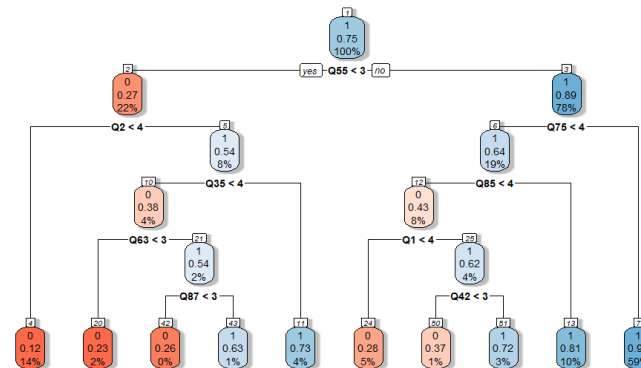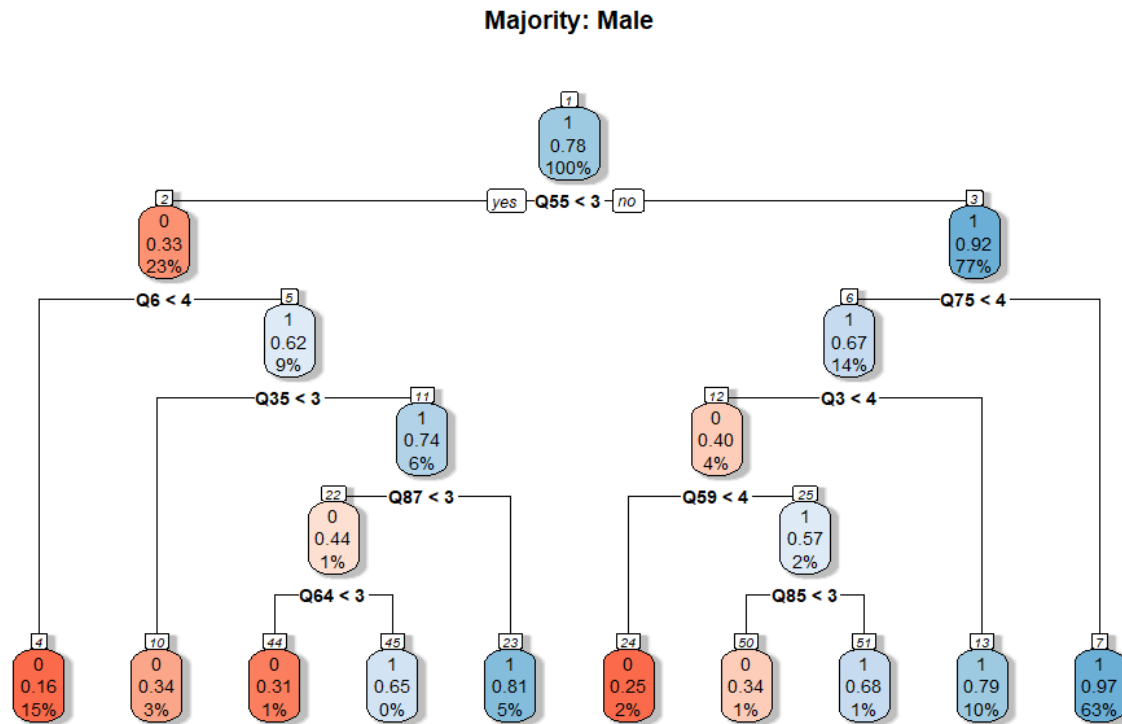- Employee Experience

Non-Majority: Male

- Leadership
- Work Experience
- Employee Experience
- Organization

Non-Majority: Female

- Leadership
- Work Experience
- Organization
- Employee Experience

4 Results

Figure 3. Decision tree for job satisfaction by Group

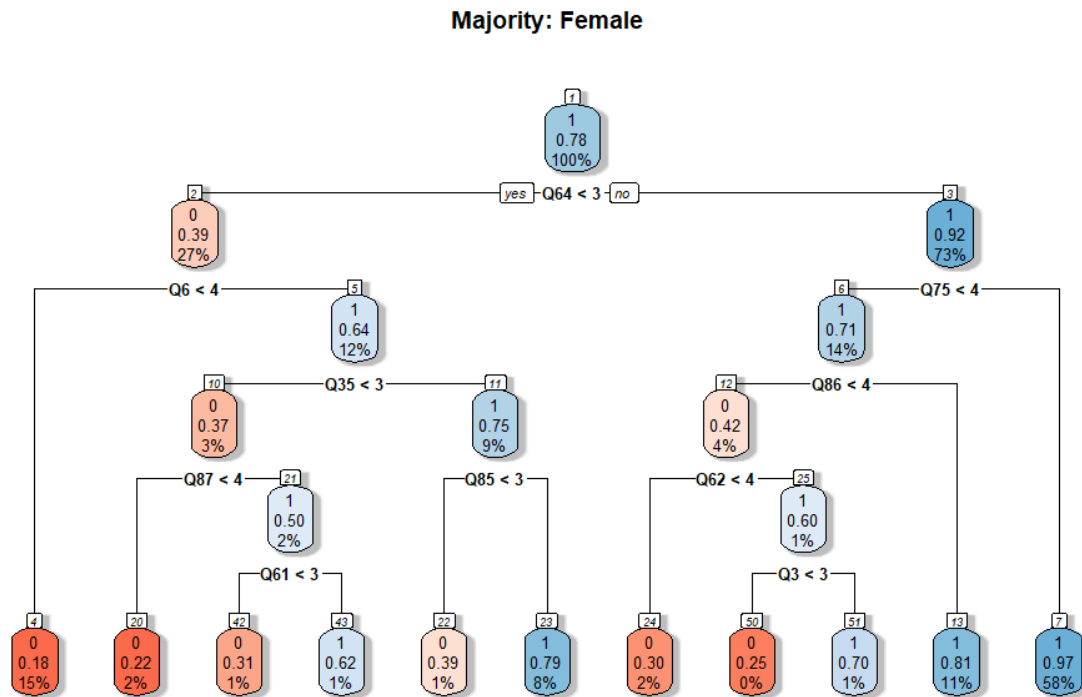Accuracy:0.8973 / Sensitivity:0.9264 / Specificity:0.7846

- Q55 (Leadership): My organization's leaders inspire motivation and commitment.

- Q6 (Work Experience): My talents are used well in the workplace.

- Q75 (DEIA): All employees recognized equally for excellent work.

- Q35 (Organization): Employees recognized for quality work.

4 Results

Figure 3. Decision tree for job satisfaction by Group

Majority: Female

- Q64 (Leadership): Management involves employees in decisions.

- Q6 (Work Experience): My talents are used well in the workplace.

- Q35 (Organization): Employees recognized for quality work.

- Q86 (Employee Experience): My work brings accomplishment.

Accuracy:0.8913 / Sensitivity:0.9201 / Specificity:0.7795

4 Results

Figure 3. Decision tree for job satisfaction by Group

non-Majority: Male
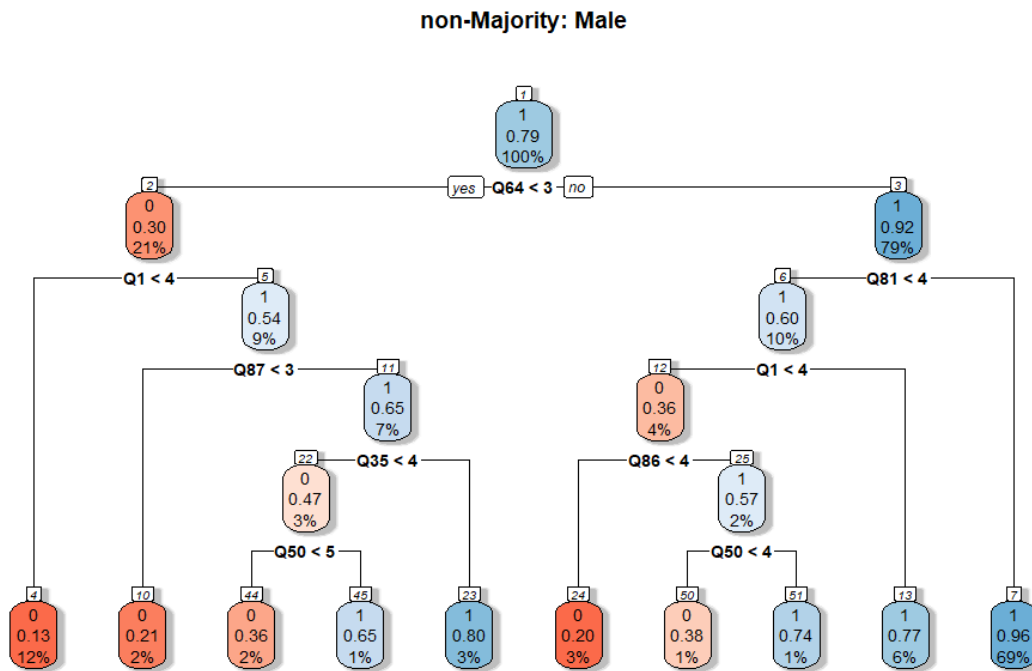
- Q64 (Leadership): Management involves employees in decisions.

- Q1 (Work Experience): I improve skills at work.

- Q86 (Employee Experience): My work brings accomplishment.

- Q35 (Organization): Employees recognized for quality work.

Accuracy:0.9017 / Sensitivity:0.9275 / Specificity:0.7938

4 Results

Figure 3. Decision tree for job satisfaction by Group

Accuracy:0.892 / Sensitivity:0.9123 / Specificity:0.8210
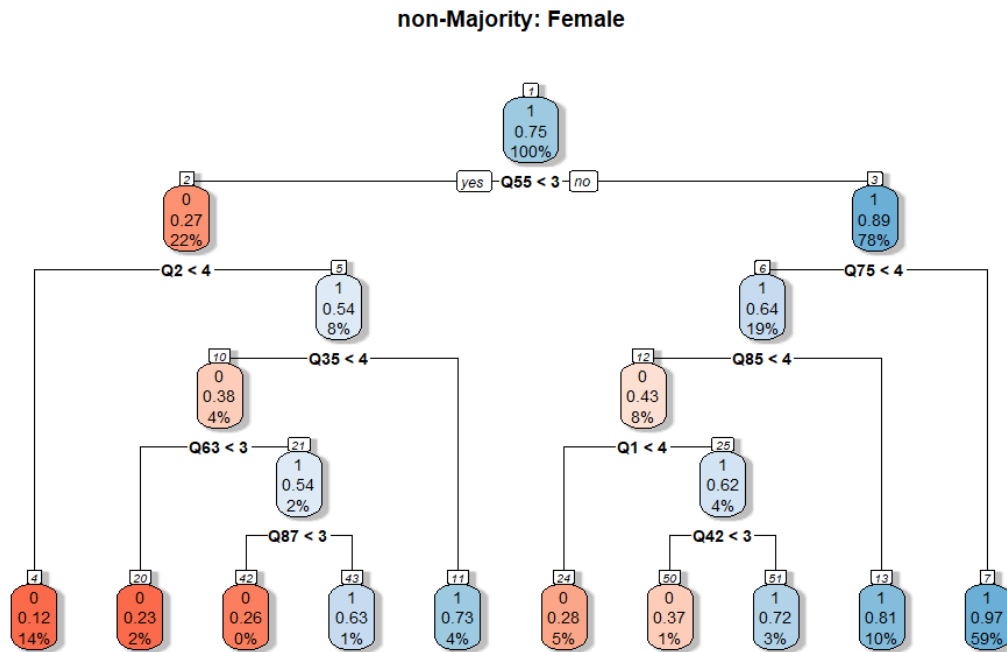
- Q55 (Leadership): Senior leaders boost workforce motivation.

- Q2 (Work Experience): Encouraged to innovate and improve.

- Q35 (Organization): Employees recognized for quality work.

- Q63 (Leadership): Management addresses organization challenges effectively.

Results

Figure 4. Decision tree for Job Satisfaction by Disability Group (Only DEIA features)

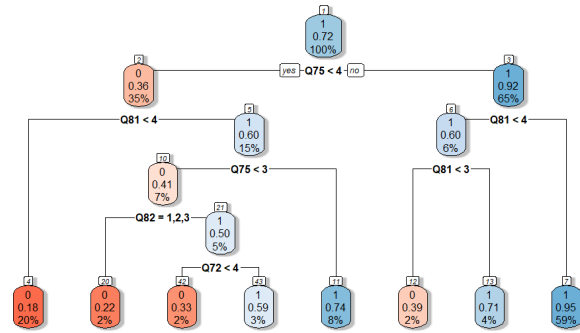Majority: Male (Disability Group)
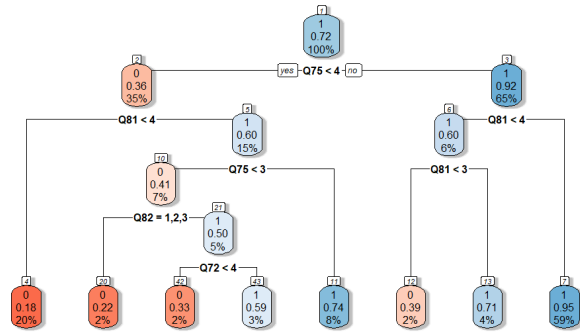
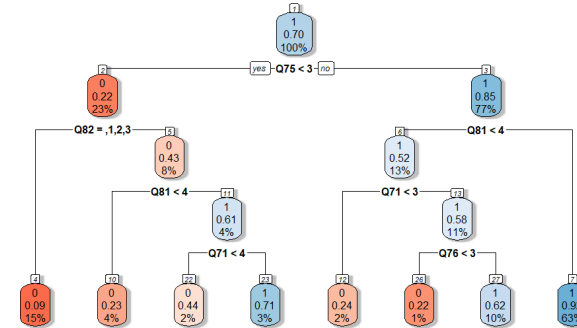- Organization DEIA
- Leader DEIA

4 Results

Figure 4. Decision tree for Job Satisfaction by Disability Group (Only DEIA features)

Majority: Male (Disability Group)   Majority: Female (Disability Group)
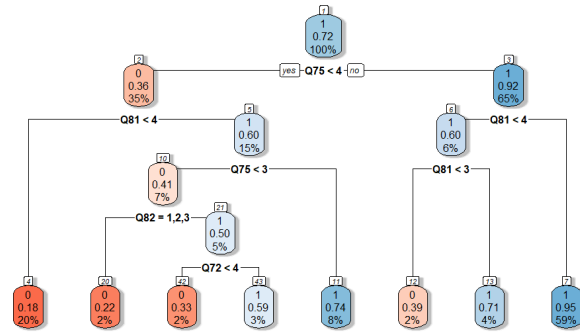
- Organization DEIA
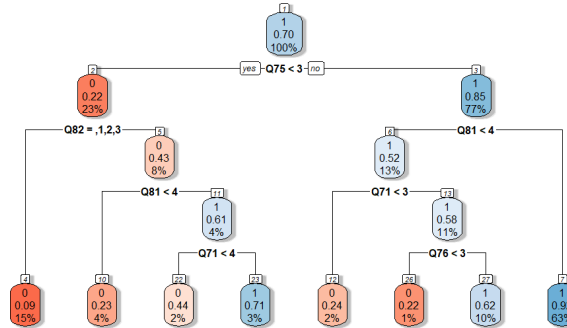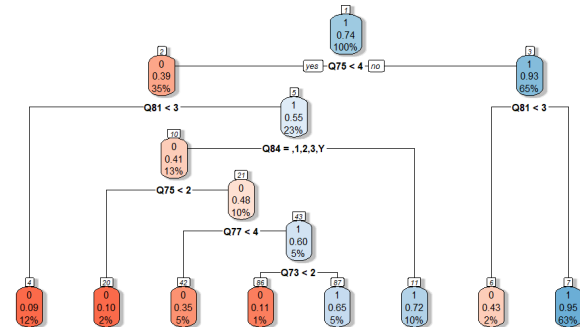- Leader DEIA

- Organization DEIA
- Accessibility

Results

Figure 4. Decision tree for Job Satisfaction by Disability Group (Only DEIA features)

Majority: Male (Disability Group)   Majority: Female (Disability Group)

- Organization DEIA
- Accessibility

- Organization DEIA
- Leader DEIA

Non-Majority: Male (Disability Group)
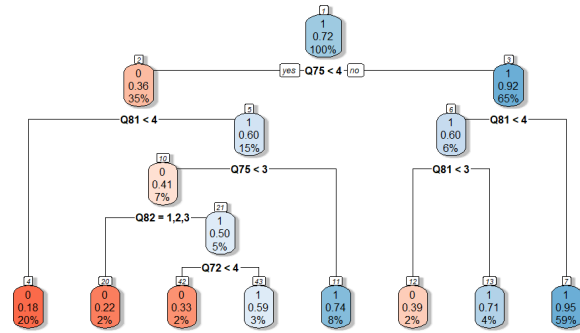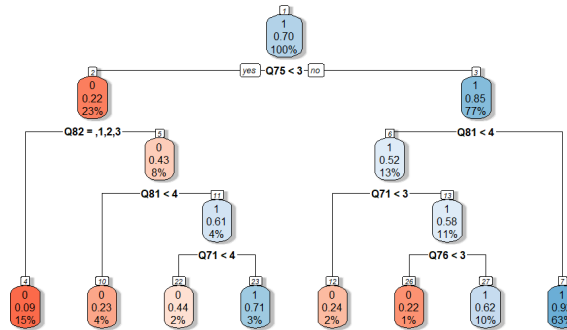
- Organization DEIA
- Accessibility

Figure 4. Decision tree for Job Satisfaction by Disability Group (Only DEIA features)

Majority: Male (Disability Group)   Majority: Female (Disability Group)
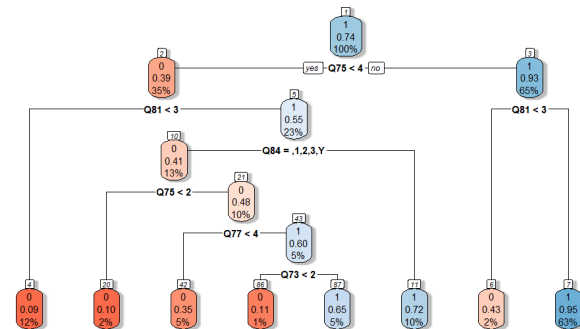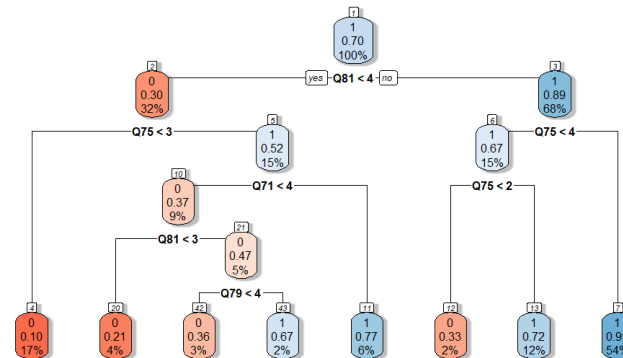
- Organization DEIA
- Leader DEIA

- Organization DEIA
- Accessibility

Non-Majority: Male (Disability Group)   Non-Majority: Female (Disability Group)

- Organization DEIA
- Accessibility

- Organization DEIA

4 Results

Figure 3. Decision tree for job satisfaction by Group

Majority: Male (Disability Group)
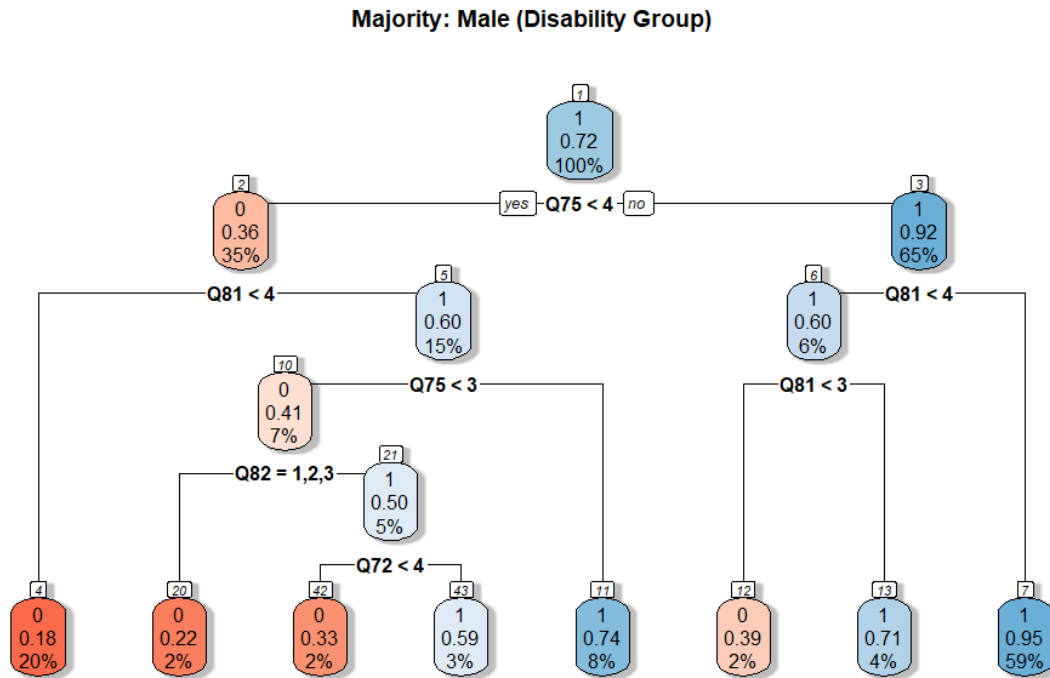
- Q75 (Org DEIA): Equal recognition for excellent work in my unit.

- Q81 (Org DEIA): Authenticity leads to success.

- Q72 (Leader DEIA): Supervisor commits to workforce diversity.

Accuracy:0.8626 / Sensitivity:0.8969 / Specificity:0.7659

4 Results

Figure 3. Decision tree for job satisfaction by Group

Accuracy:0.8600 / Sensitivity:0.8653 / Specificity:0.8429

- Q75 (Org DEIA): Equal recognition for excellent work in my unit.

- Q82 (Accessibility): Easily request accessibility accommodations.

- Q81 (Org DEIA): Authenticity leads to success.

4 Results

Figure 3. Decision tree for job satisfaction by Group

non-Majority: Male (Disability Group)
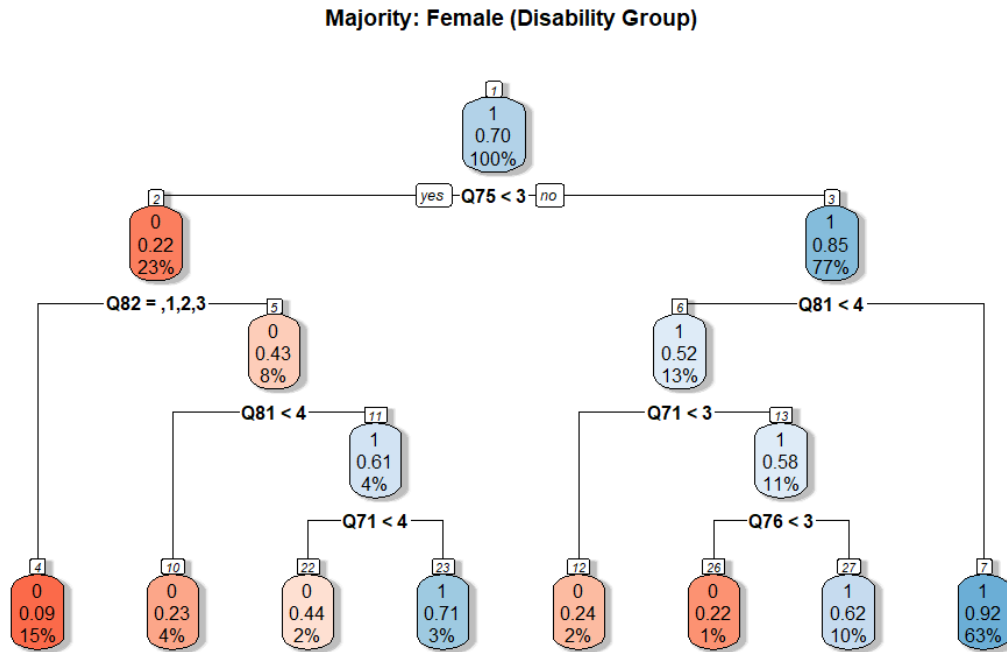
- Q75 (Org DEIA): Equal recognition for excellent work in my unit.

- Q81 (Org DEIA): Authenticity leads to success.

- Q84 (Accessibility): Organization meets accessibility needs.

Accuracy:0.8782 / Sensitivity:0.8976 / Specificity:0.8088

4 Results

Figure 3. Decision tree for job satisfaction by Group

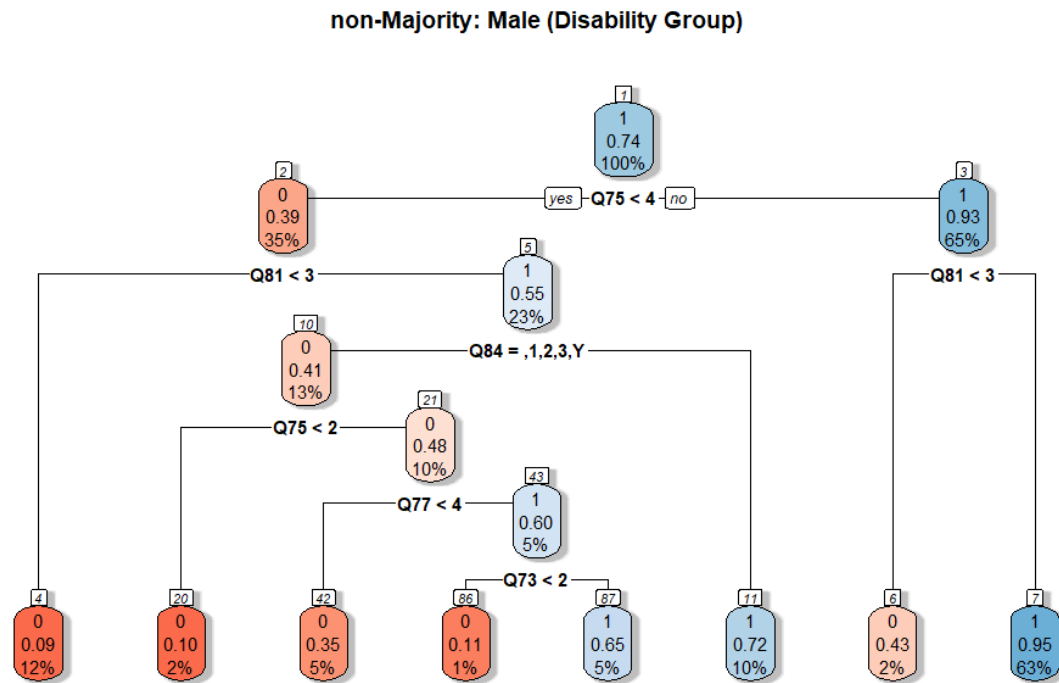non-Majority: Female (Disability Group)

- Q81 (Org DEIA): Authenticity leads to success.

- Q75 (Org DEIA): Equal recognition for excellent work in my unit.

- Q71 (Org DEIA): Organization promotes diversity in management.
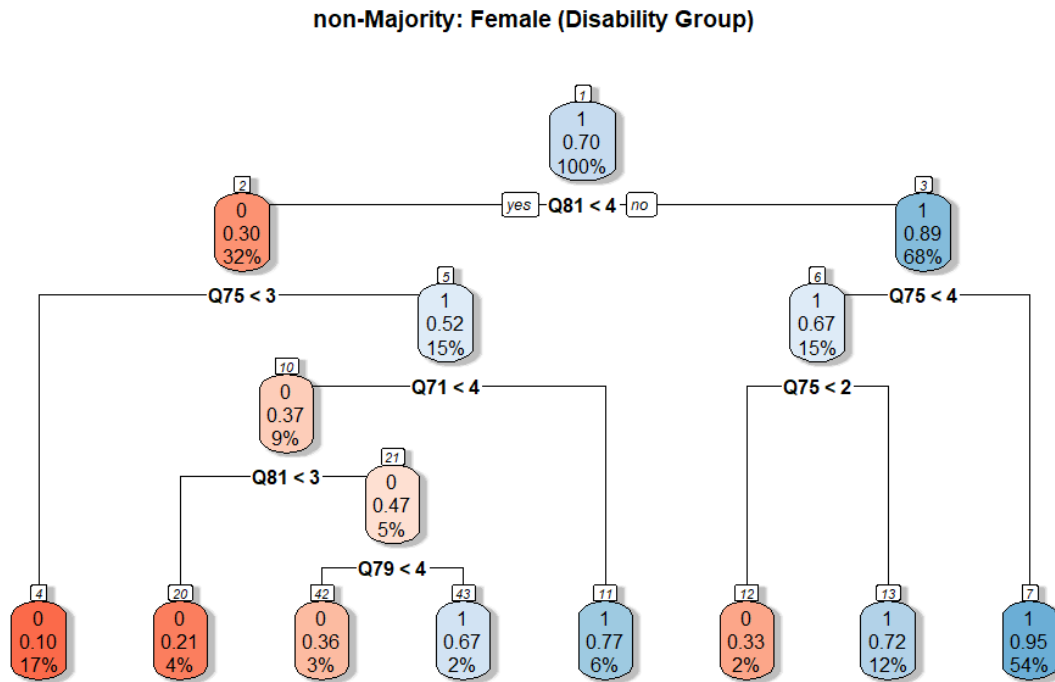
Accuracy:0.8646 / Sensitivity:0.8965 / Specificity:0.7840

5 Conclusion

▶ Traditional regression analysis had limitations in estimating job satisfaction using individual survey items.

- This study utilized machine learning to predict and classify job satisfaction using various survey items.

5   Conclusion

▶ **Traditional regression analysis had limitations in estimating job satisfaction using individual survey items.**

- This study utilized machine learning to predict and classify job satisfaction using various survey items.

▶ **The research examined the importance of each item in the Federal Employee Viewpoint Survey (FEVS) for job satisfaction among different groups.**

- Overall, similar job satisfaction levels were found, but the factors and items contributing to job satisfaction varied across groups.
- Even within the subgroup with disabilities, different factors contributed to job satisfaction.

5 Conclusion

▶ Traditional regression analysis had limitations in estimating job satisfaction using individual survey items.

- This study utilized machine learning to predict and classify job satisfaction using various survey items.

▶ The research examined the importance of each item in the Federal Employee Viewpoint Survey (FEVS) for job satisfaction among different groups.

- Overall, similar job satisfaction levels were found, but the factors and items contributing to job satisfaction varied across groups.
- Even within the subgroup with disabilities, different factors contributed to job satisfaction.

▶ These findings can inform the development of targeted policies in human resource organizations, focusing on each group based on race, gender, etc.

5 Conclusion

Limitations

▶ Due to limitations of the machine, this study only utilized decision trees for analysis.

- In future research, we aim to utilize more sophisticated models such as Random Forest, XGBoost, etc., to enhance our analysis.

▶ In this study, we focused solely on demographic characteristics such as race and gender.

- In future research, we intend to incorporate a broader range of characteristics to build a more comprehensive classification model.

THANK YOU