Supervised and unsupervised learning with Johnson & Johnson Support Ticket

Ignacio Palma, Jairo Melo, Jamil Mahboob and Vikram Khade

York University

ML1000, Project presentation

22 March , 2019

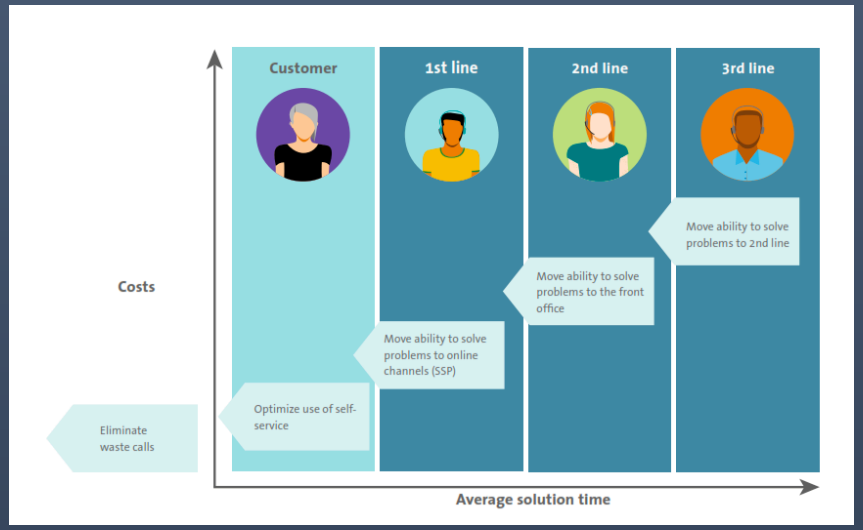
Objective

- Information Technology Service Management at Johnson and Johnson is always looking for opportunities to improve support services processes avoiding business impact reducing time and cost.

What's the Problem?

1. Improve resolution time

2. Find alternatives to Shift-left work



Proposed Alternatives

- Predict which Group Level will ended up resolving the issue so the lead of the support Team allocate the resources ahead.
- Provide an estimation to the requester when the ticket might be resolved to manage uncertainty or use the time to look for alternatives
- Find opportunities to Move support from the L3 level to L2 or L1.

What's in the Data set?

- A CSV file extracted from the ITSM system
- 21750 records
- From 2018 to 2019

Features:

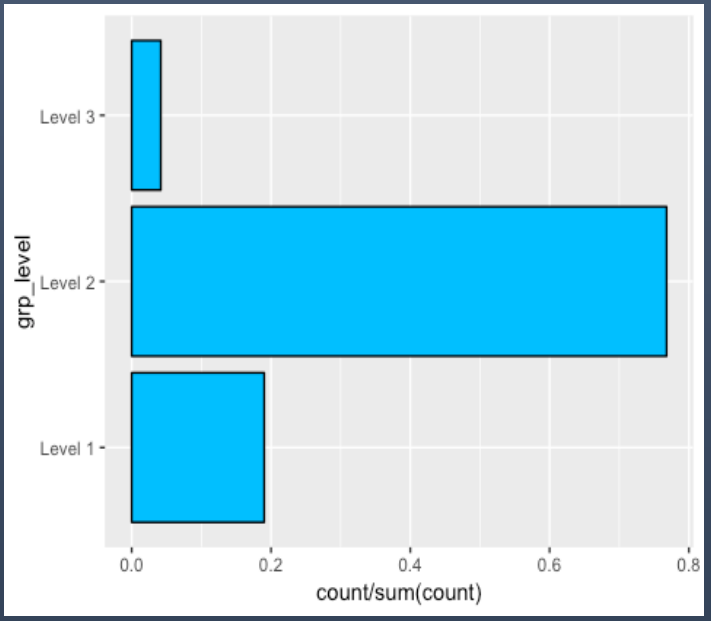
- Application: Over 500 different applications
- Application category: 15 categories
- Product Line: 2 options (eg Cloud/Premise)
- Open or creation Date
- Resolution Date
- Priority: 1, 2 or 3 (1 lowest - 3 Max)
- Impact: 3 levels, (1 user – 3 all organization)
- Region (13 regions) of user's location
- Support Group who's providing the resolution (Over 200 support groups)
- Group Level: 1 low expert – 3 High expert

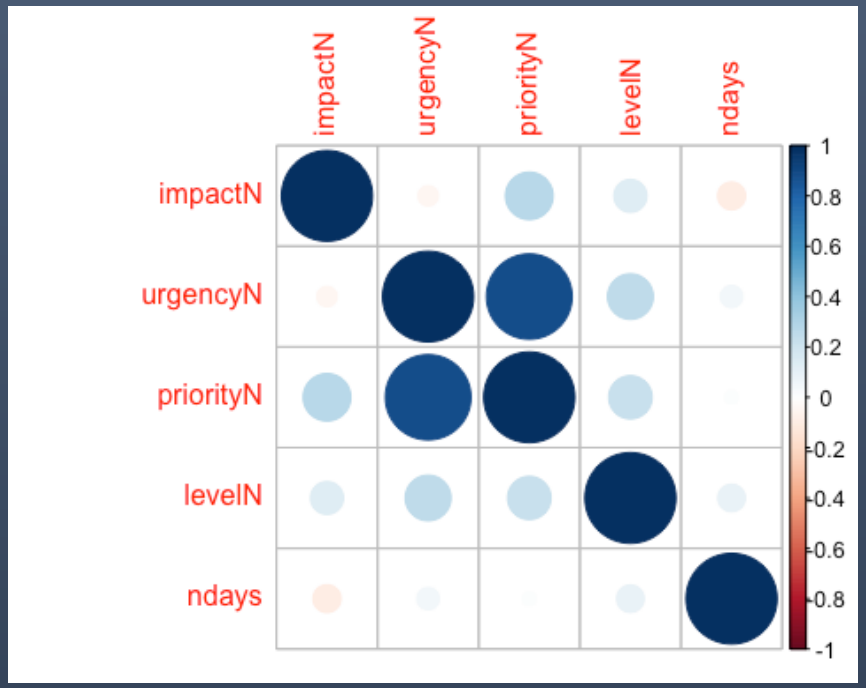
Supervised Learning – Group Level

What is the Problem?

- The resolution of an issue is time sensitive, and the escalation process is causing not only unplanned resource allocation but business impact. Reliability team needs to identify the Group Level who will finally be involved in the resolution of the a ticket while the ticket is being created.

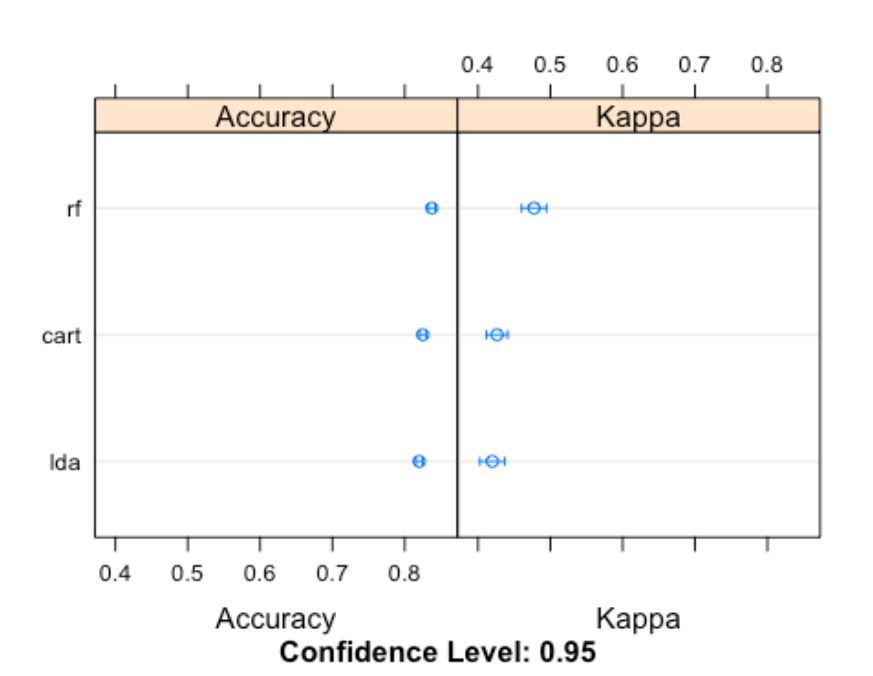
Predicting Group Level





Supervised Learning – Group Level

- **Solution**
- Predicting the Group Level using Random Forest

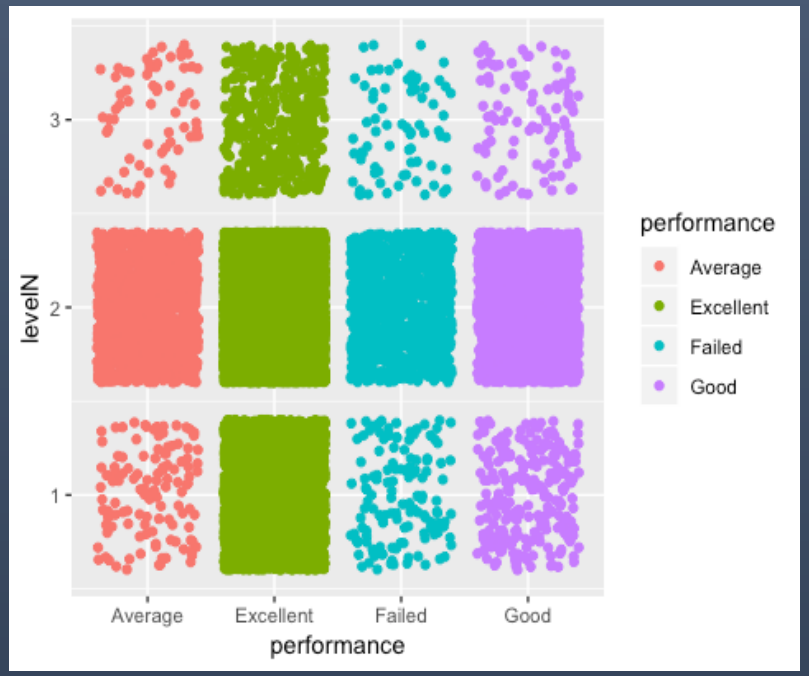


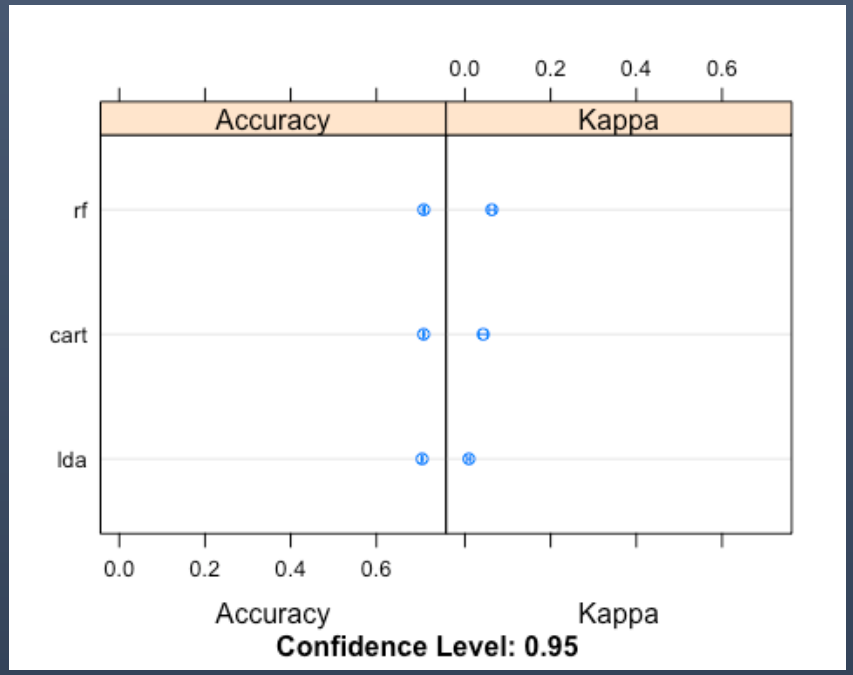
		Balanced Accuracy		
Methods	Accuracy	Level 1	Level 2	Level 3
LDA	0.82	0.70	0.67	0.50
CART	0.82	0.70	0.67	0.50
RF	0.83	0.73	0.70	0.50

Supervised Learning - Performance

What is the Problem?

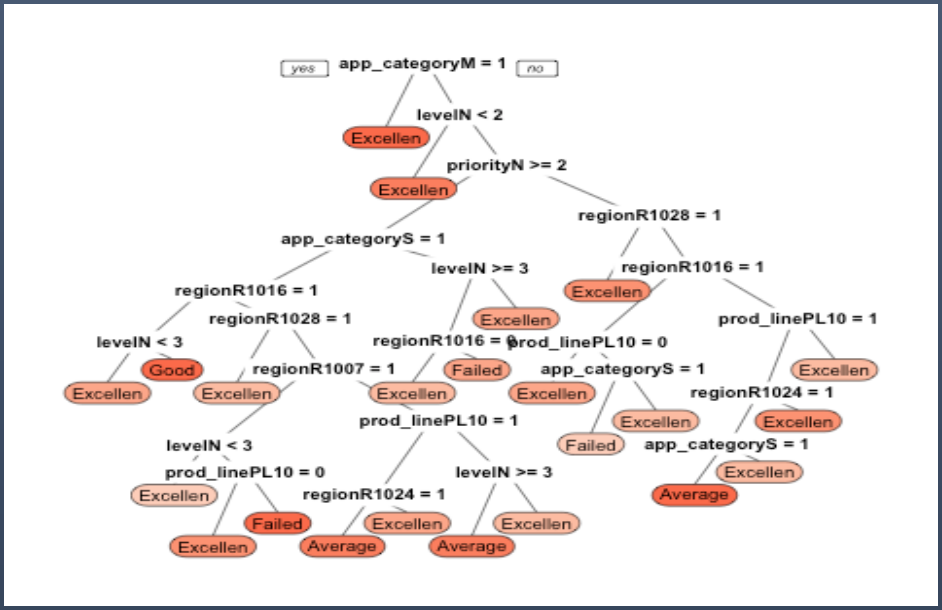
- Users complain when the issue still outstanding without ETA, or the waiting time could have been used to escalate the issue or implement a workaround.
- New Feature Performance = Resolved - Opened





Supervised Learning - Performance

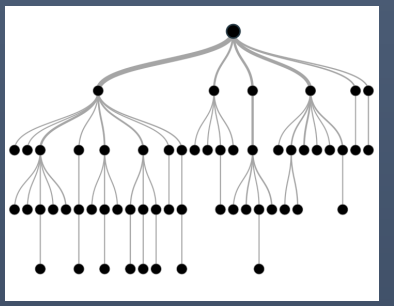
- **Solution**
- Predicting the performance of a new ticket using Classification and regression trees CART method



		Balanced Accuracy			
Methods	Accuracy	Excellent	Good	Average	Failed
LDA	0.71	0.50	0.50	0.50	0.50
CART	0.71	0.51	0.51	0.51	0.51
RF	0.71	0.50	0.50	0.50	0.50

Conclusion - Supervised Learning

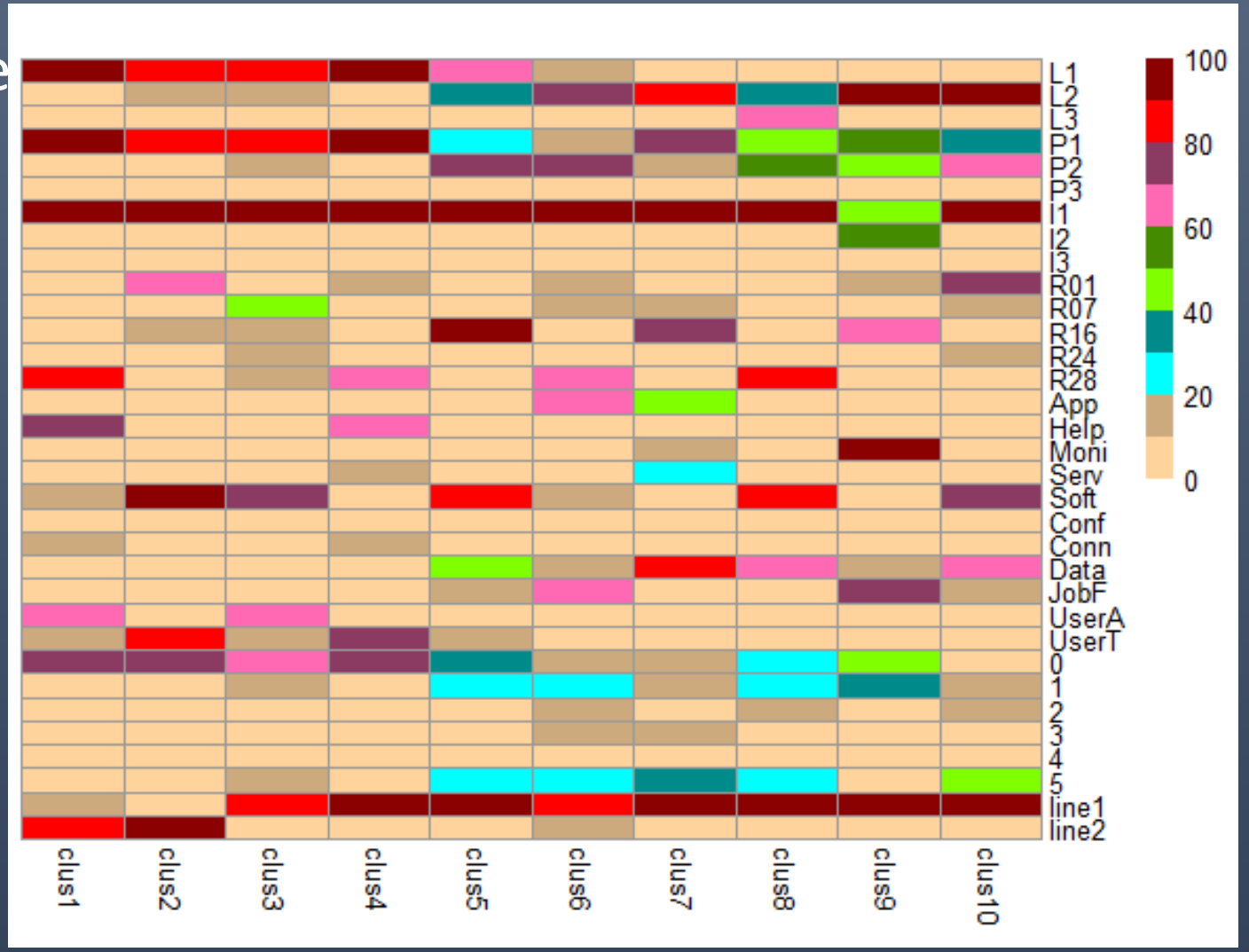
- Random Forest works well to predict the Group Level
- Classification and regression Trees (CART) method performed a slight better than the other methods, but with no optimal results.
- Potential causes, under sampling, low predictability features
- Room for further improvements:
  - Include additional features at the vendor level
  - Expanding the model to include other product lines
  - Bigger datasets.



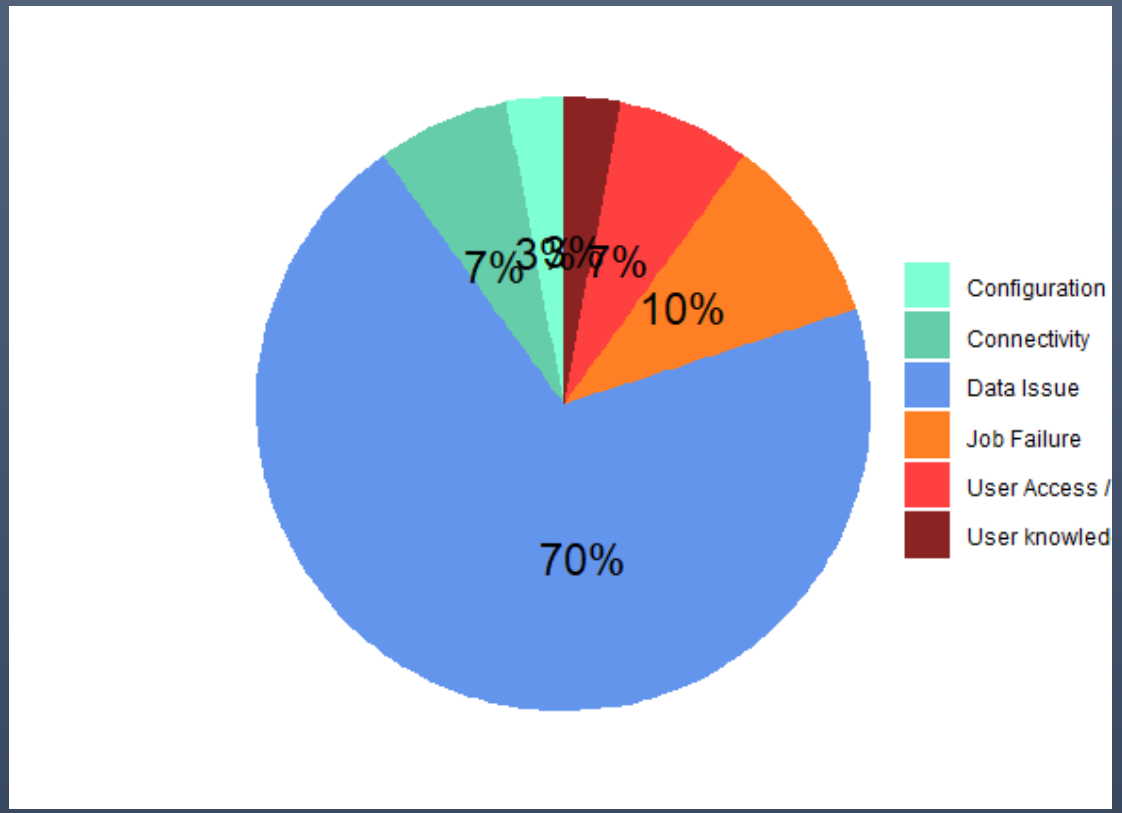
We hope that our work will inspire further discussions at Johnson & Johnson regarding the evaluation of strategies such as predicting resolution. We believe that deeper understanding of those matters would allow the comparison of different methods in a more systematic manner which would be beneficial for the entire organization.

Clustering

- PAM
- Undersampling Level 1 and Leve



Cluster #8


7%
3%
3%
7%
10%
70%
Configuration
Connectivity
Data Issue
Job Failure
User Access /
User knowled

Conclusions

- Recommend Random Forest for predicting group level and performance.

- Recommend segment given by cluster 8 for further analysis to J&J.