

INTELLIGENT CHILDCARE MATCHER AND WAITLIST OPTIMIZER



INDIVIDUAL REPORT

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Personal background

I am a mid-career worker in network infrastructure domain prior taking Mtech Intelligent System programme.

Personal contribution to project

Rule Discovery Modelling & Implementation:

- I prepared a data preparation pipeline. Data inputs are pre-processed through this pipeline before they are passed into rule discovery models.
- I set up rule discovery models in the form of decision tree models. I experimented with two different types of decision trees, namely Decision Tree Regressor and Decision Tree Classifier using Scikit-Learn in Python. I concluded with using Decision Tree Regressor as it is more suitable to work with rule optimisation model for this project's system.

Rule Optimisation Modelling & Implementation:

- For rule optimisation model implementation, I implemented the use of genetic algorithm (GA) to find optimal rules.
- I designed the fitness function, soft & hard constraints, chromosome design and how to use genetic operators.

Documentation: While I was preparing the documentation for design and implementation of waitlist-optimizer system used by childcare operators, I went through the thinking process about system design, and then articulated about how different forms of reasoning approaches are brought together to form a hybrid intelligent system.

Report edits: I assisted the team to in preparing the organisation of project report. I also assisted the team to edit the overall project report.

Data Preparation: During early phase of project, I assisted on some data cleaning of data extracted from ECDA website by fellow teammate, for use in parent-facing system of project.

Simple POC: During project ideation, I applied what I learnt from workshops during class and set up a mini POC, where it is similar to Reasoning System class's workshop setup. This mini setup using KIE Workbench is based on this project's childcare case scenario and it helps in some understanding on whether search like Tabu or Late Acceptance techniques is useful for this project.

What I have learnt

I learnt how the following different forms of reasoning may come together form a hybrid intelligent system:

- Deductive Reasoning: Rule based system, Fuzzy Logic
- Inductive Reasoning: Decision Tree
- Optimisation: Genetic Algorithm

Rule Discovery Modelling:

- I learnt about the unique characteristics of Scikit-Learn libraries for decision tree modelling in terms of data input requirements, and also about differences in the use of Decision Tree Regressor and Decision Tree Classifier.
- When I was looking at ways to set up a fitness function for generic algorithm use, I learnt about how to interpret Decision Tree Regressor and Classifier model outputs.

Rule Optimisation Modelling:

- I experienced experimenting with different fitness function design, including soft and hard constraints for GA during implementation, I learnt about the differences when GA works with Decision Tree Regressor and when GA works with Decision Tree Classifier.

How to apply in future work

I had observed increasing challenges for enterprise network operations where headcount remains flat or is decreasing, and I understand this is the trend forward within private companies and public sector in Singapore. Network operations need to operate faster in an environment that is more complicated as ever.

If I am working in the domain of network infrastructure in future, I would apply what I had learnt to address the widening gap between headcount and increasing operation demand by:

- Use contextual network telemetry data to make networks smarter, simpler to manage and more secure.
- Design intelligent systems, where it analyzes data to provide network operations with improved visibility, relevant insights, and guided actions.