UTM

UNIVERSITI TEKNOLOGI MALAYSIA

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FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SESSION 2020/2021 SEMESTER 1

SCSJ 3553: ARTIFICIAL INTELLIGENCE

SECTION 11

PROGRESS 3 – ASSIGNMENT 2

STATE SPACE SEARCH

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6.0 STATE SPACE SEARCH

6.1 Details of State and Action

1st State: Material detector will detect whether there is any garbage material or not. If no any material is detected, the recycling bin has no response and remains closed.

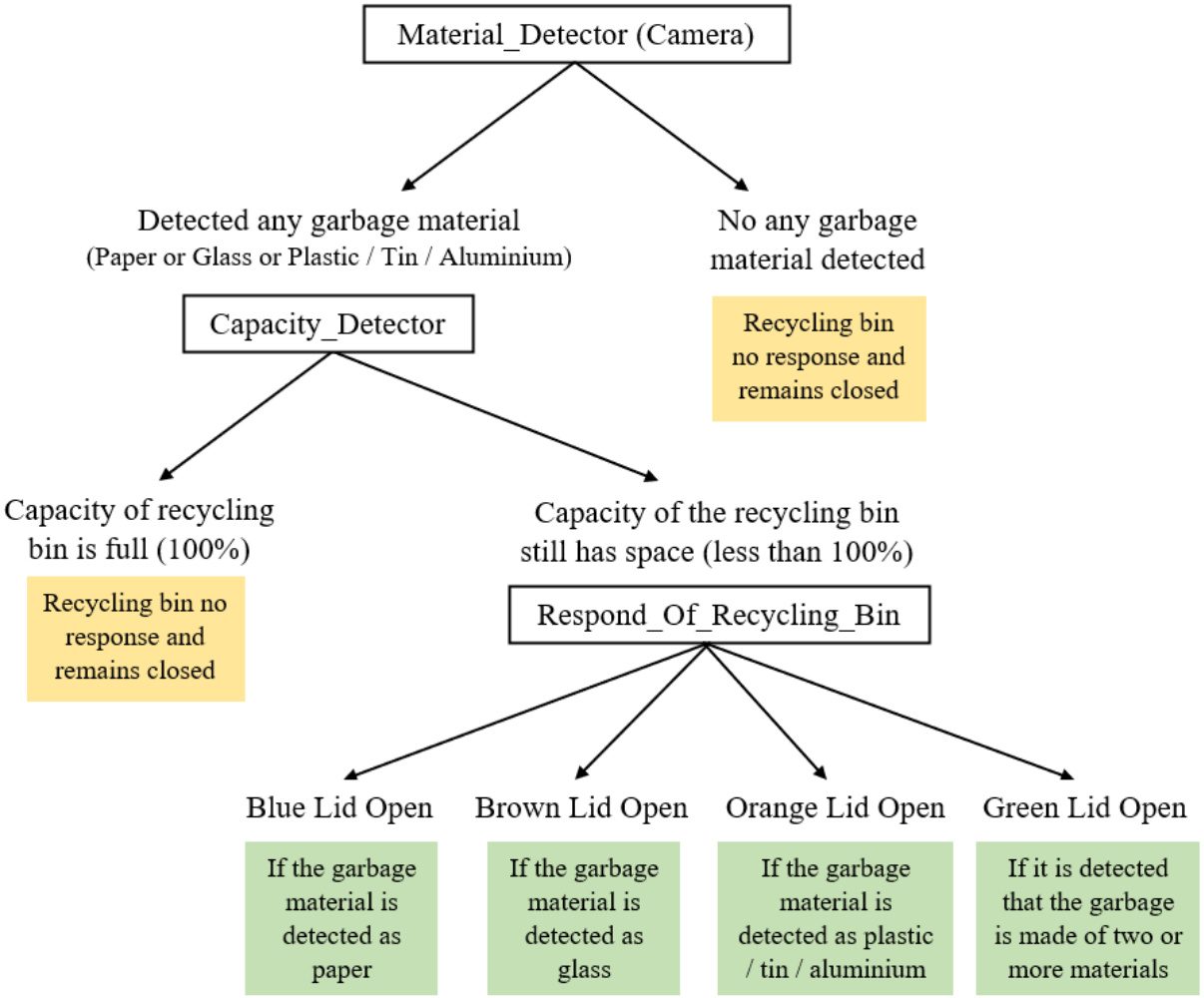
2nd State: Material detector will detect whether the material of garbage is paper or glass or plastic/tin/aluminium or the garbage is made of two or more materials.

3rd State: After checking the material of garbage, the capacity detector will detect whether the capacity of the recycling bin is full or not. If the capacity of the recycling bin is full, the recycling bin has no response and remains closed.

4th State: After checking that the capacity of the recycling bin still has space, the lid of the recycling bin will open.

- If the garbage material is detected as paper, then the blue lid of the recycling bin will open.
- If the garbage material is detected as glass, then the brown lid of the recycling bin will open.
- If the garbage material is detected as plastic or tin or aluminium, then the orange lid of the recycling bin will open.
- If it is detected that the garbage is made of two or more materials, the green lid of the recycling bin will open.

Overview Action Graph



6.2 Hypergraph

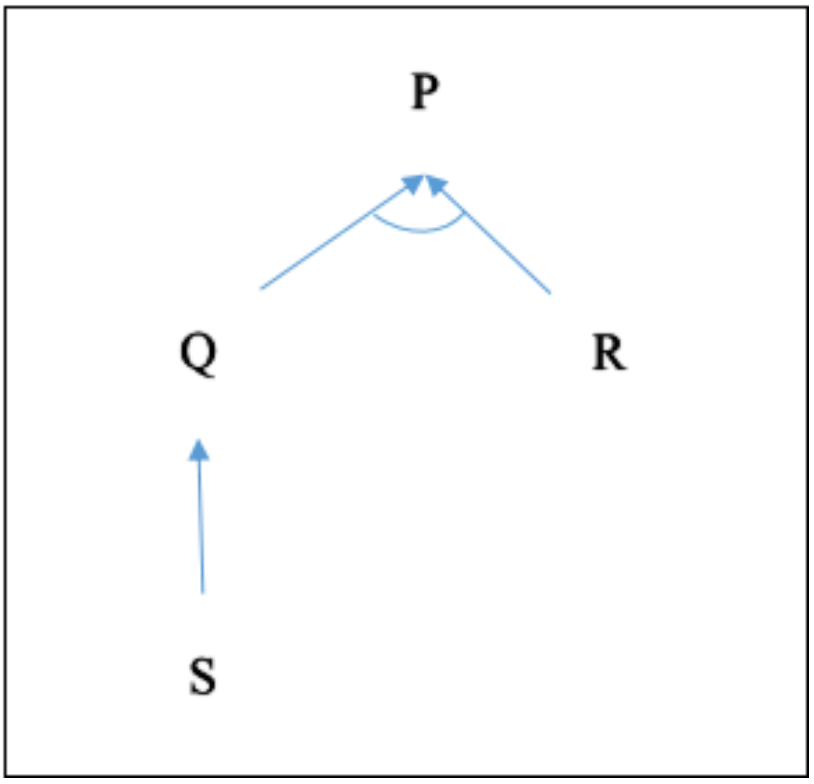
6.2.1:

P = Recycle bin have no response

Q = Capacity detector notice capacity < 100%

R = Material detector did not notice any material

S = current Recycle bin have no response



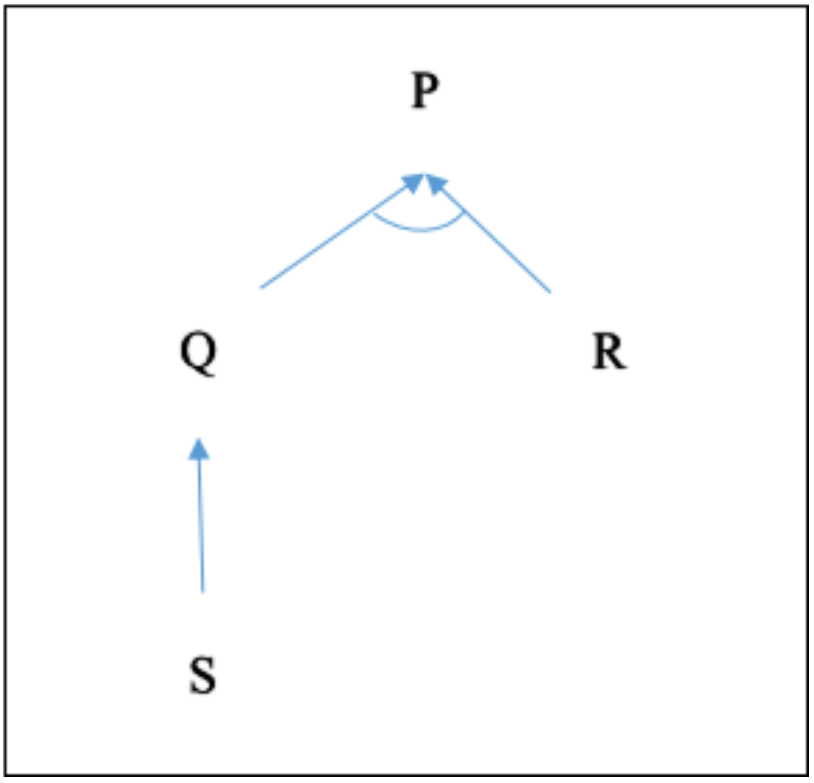
6.2.2:

P = Recycle bin have no response

Q = Capacity detector notice capacity = 100%

R = Material detector notice any material (Paper/Glass/PTA)

S = current Recycle bin have no response



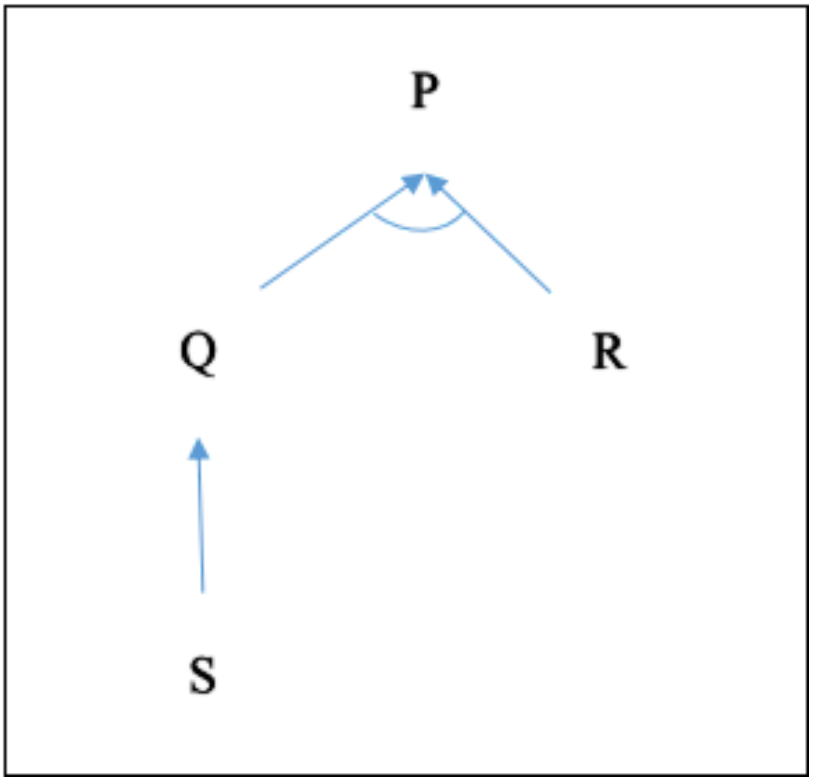
6.2.3:

P = Recycle bin open Paper slot

Q = Capacity detector notice capacity < 100%

R = Material detector notice any Paper material

S = current Recycle bin have no response



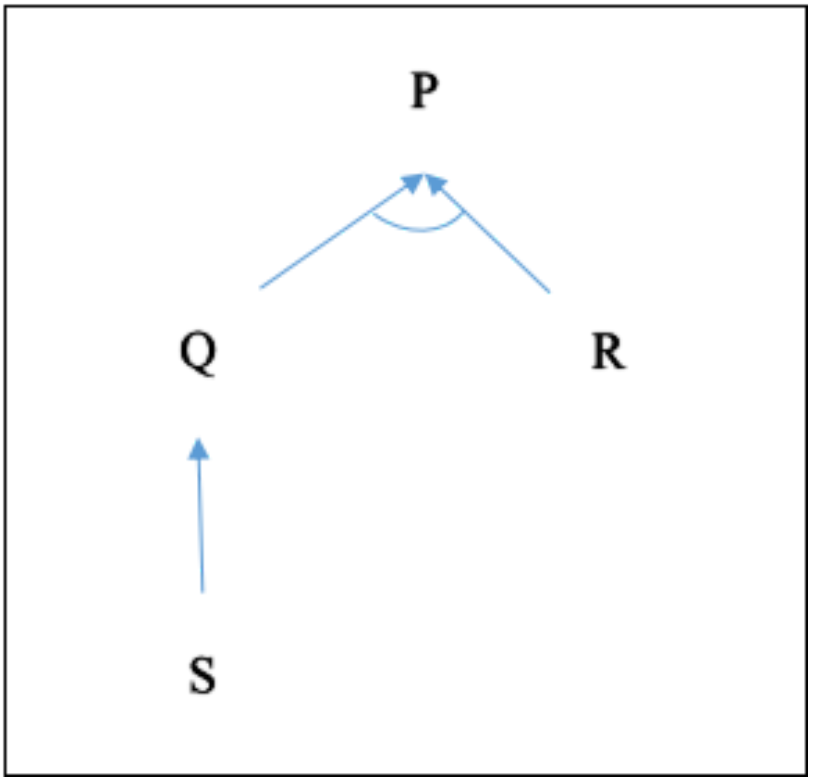
6.2.4:

P = Recycle bin open Glass slot

Q = Capacity detector notice capacity < 100%

R = Material detector notice any Glass material

S = current Recycle bin have no response



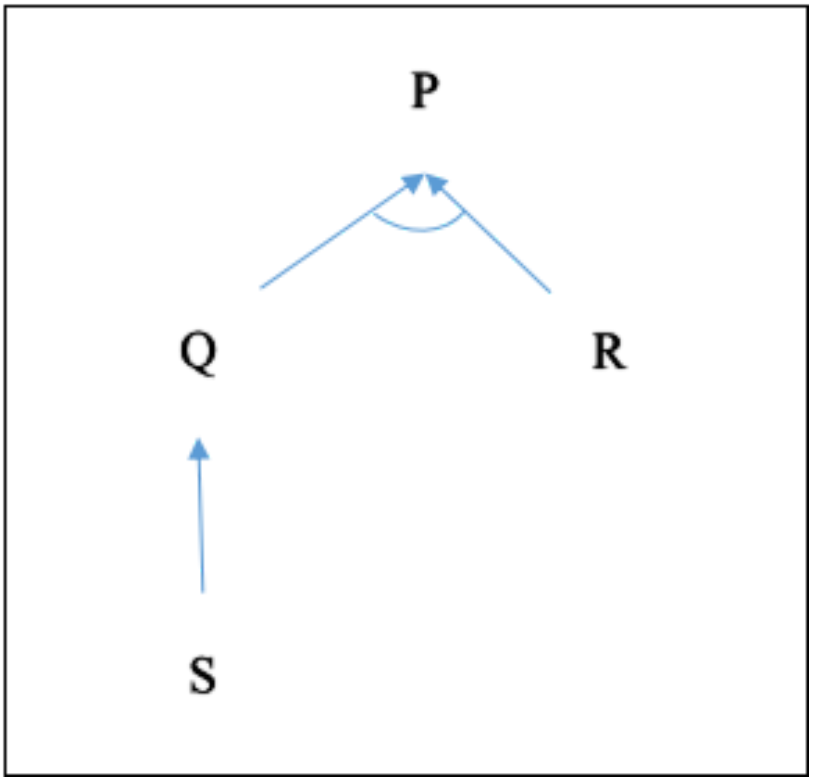
6.2.5:

P = Recycle bin open PTA slot

Q = Capacity detector notice capacity < 100%

R = Material detector notice any PTA(Plastic/Tin/Aluminium) material

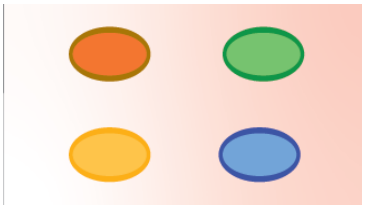
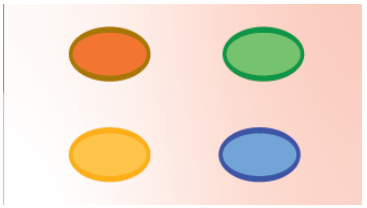
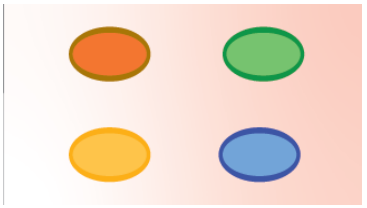
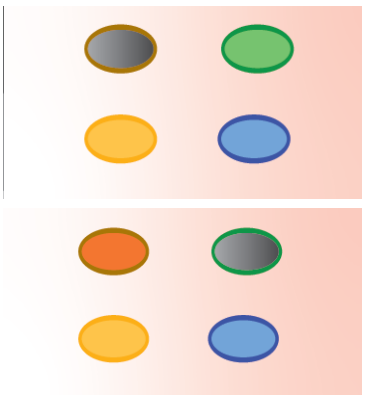
S = current Recycle bin have no response

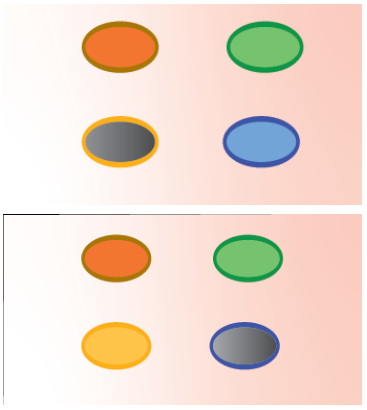


6.3 Problem Formulation

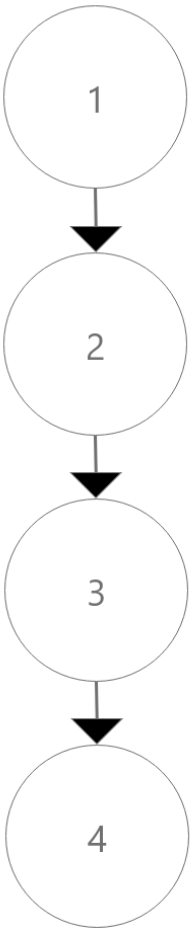
1. Initial State: The entrance slot of the recycling bin closed.
2. Action: The entrance slot of the recycling opened and remains closed.
3. Goal: The garbage thrown into the recycling bin based on its materials.
4. Path Cost: 1 unit per action.

6.3.1 Table of Problem Formulation

No.	Correspond KRs	Material Detector	Capacity Detector	Action
1.	KR1	 Not detected	 Full	 Closed
2.	KR2	 Not detected	 Empty / Not fully occupied	 Closed
3.	KR3, KR5, KR7, KR9, KR11, KR13, KR15	 Detected	 Full	 Closed
4.	KR4, KR6, KR8, KR10, KR12, KR14, KR16	 Detected	 Empty / Not fully occupied	

				 One of the slots opened.

6.4 Sequence of Actions Leading From Initial State To Goal State



Initial State: All of the entrance slots closed

Goal: 1 of the slot opened to throw the garbage

6.5 Explanation of Formulate Problem To Support The Proposed KR

1. The entrance slot will not be opened if there is no material detected by the material detector and the capacity detector detected full in the bin as shown in KR1.

2. The entrance slot will not be opened if there is no material detected by the material detector although the capacity detector detected empty or not fully occupied in the bin as shown in KR2.

3. Material detector detected a material, however, the capacity detector detected that the bin was full. The entrance slot will not be opened as shown in KR3. KR5, KR7, KR9, KR11, KR13, and KR15.

4. The entrance slot will open one slot according to the type of the material detected by the material detector and the capacity detector detected the selected bin is empty or not fully occupied. The situations are shown in KR4, KR6, KR8, KR10, KR12, KR14, and KR16.