Introduction into Artificial Intelligence

Mid-term 1. – Group B

Our goal is to change MOUSE into PARTY. We can change only one letter at a time, and we are only allowed to change into a valid, meaningful English word.

1. **Description:**

$$H_1 \in \{A, B, C, \dots, Z\}$$
$$H_2 \in \{A, B, C, \dots, Z\}$$
$$\vdots$$
$$H_5 \in \{A, B, C, \dots, Z\}$$
$$W = set\ of\ valid\ English\ words$$

2. **Set of valid states:**

$$S \subseteq H_1 \times H_2 \times \dots \times H_5$$
$$S = \left\{ < a_1, \dots, a_5 > \middle| \begin{matrix} < a_1, \dots, a_5 > \in H_1 \times \dots \times H_5 \\ \wedge < a_1, \dots, a_5 > \in W \end{matrix} \right\}$$

3. **Initial state:**

$$s_0 = < M, O, U, S, E >$$

4. **Set of goal states:**

$$G = \{< P, A, R, T, Y >\}$$

5. **Set of operators:**

$$O = \left\{ o_{i,l} \middle| i \in \{1, 2, \dots, 5\} \wedge l \in \{A, B, \dots, Z\} \right\}$$

6. **Domain of operators:**

$$dom(o_{i,l})$$
$$= \left\{ < a_1, \dots, a_5 > \middle| \begin{matrix} < a_1, \dots, a_5 > \in S \wedge l \neq a_i \wedge \\ \bigwedge_{j=1}^{5} j = i \supset a_j = l \supset < a_1, \dots, a_5 > \in W \end{matrix} \right\}$$

$$(check\ if\ we\ change\ the\ letter, we\ would\ get\ a\ valid\ English\ word)$$

7. **Effect definition (transition function):**

$$o_{i,l}(< a_1, \dots, a_5 >) = < b_1, \dots, b_5 >$$
$$b_j \qquad \begin{cases} l & if\ j = i \\ a_j & else \end{cases}$$
$$j \in \{1, 2, \dots, 5\}$$