AI PROJECT Examples and clarifications

FAI CLASS-2023

Undergraduate: An Example with 5 boxes

AI Project:

5 boxes are available - one robotic arm - only 3 locations (L1,L2,L3) are available on the table

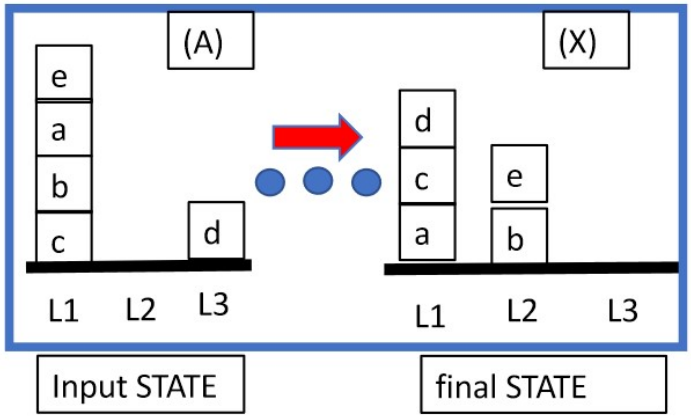
AI Project: Actions moving boxes

Clarifications of the Actions:

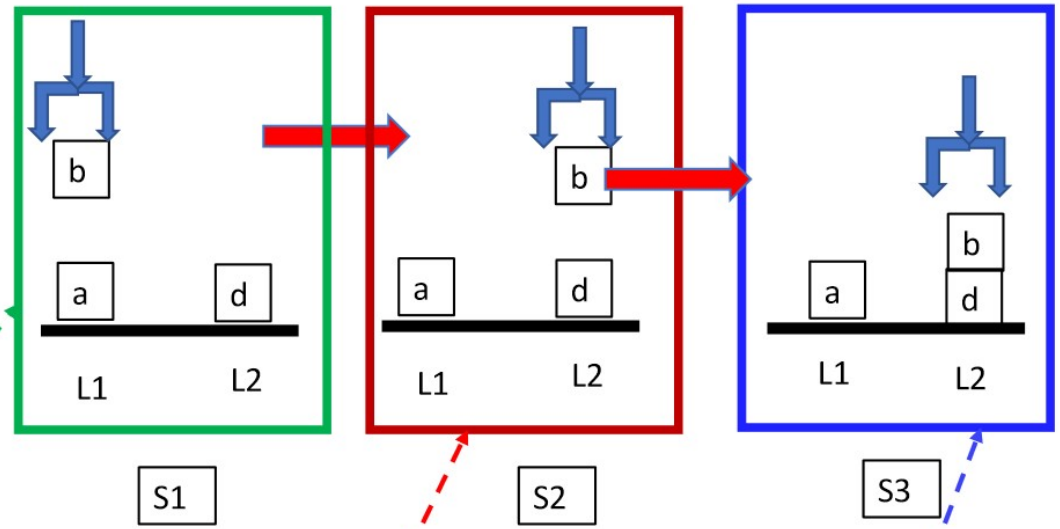
- **PICK-UP(Li)** : the robotic arm picks up a block from a location Li, (i=1,2,3) at the table;
- **PUT-DOWN(Li)** : the robotic arm puts down a block at a location Li, (i=1,2,3) on the table;
- **STACK(Li)** : the robotic arm stacks a block on another block at a location Li (i=1,2,3);
- **UNSTACK(Li):** the robotic arm lifts up a block from a stack of blocks located at Li, (i=1,2,3);
- **MOVE (Li, Lk)**: the robotic arm moves a block (already grabbed and lifted) from the location above Li to the next location **above** Lk without to place it, (i,k=1,2,3), i≠k;
- **NOOP**: the robotic arm performs no action.

AI Project: 5 boxes

- In each state one action will be performed by using one robotic arm. To achieve to goal (final state) a sequence of actions has to be performed on the blocks by arranging them from the initial state (A) to destination state (X) as shown in the figure below

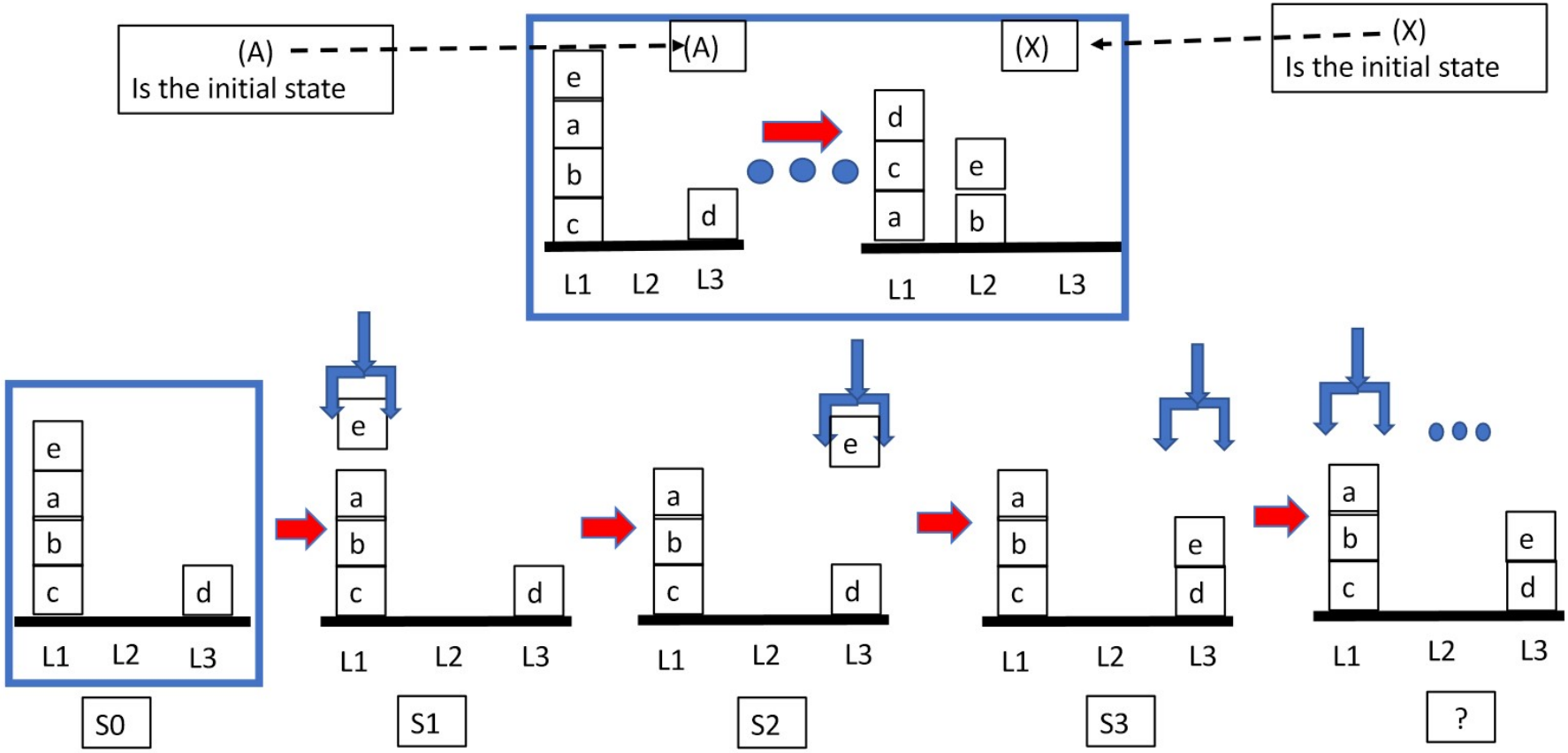


An example of 3 Actions



{(U(b, a, L1),S1); (M(L1, b, L2),S2); (S(b, d, L2),S3)}

An Example: 5 boxes with one robotic arm



Graduate: An Example with 7 boxes

AI Project:

7 boxes are available - two robotic arms - only 2 locations (L1,L2) are available on the table

AI Project: Actions moving boxes

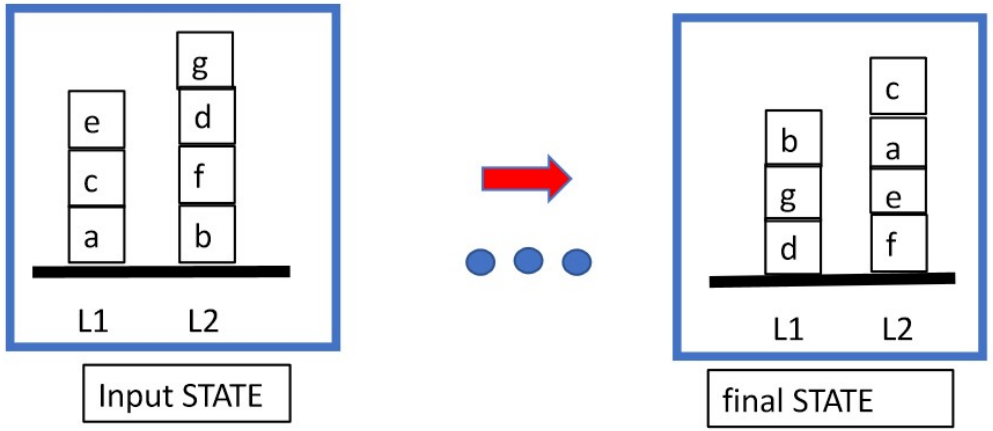
Clarifications of the Actions:

- **PICK-UP(Li)** : a robotic arm picks up a block from a location Li, (i=1,2) at the table;
- **PUT-DOWN(Li)** : a robotic arm puts down a block at a location Li, (i=1,2) on the table;
- **STACK(Li)** : a robotic arm stacks a block on another block at a location Li (i=1,2);
- **UNSTACK (Li):** a robotic arm lifts up a block from a stack of blocks located at the location Li, (i=1,2);
- **MOVE(Li, Lk)**: a robotic arm moves a block (already grabbed and lifted) from the location above Li to the location above Lk without to place it, (i,k=1,2), i≠k;

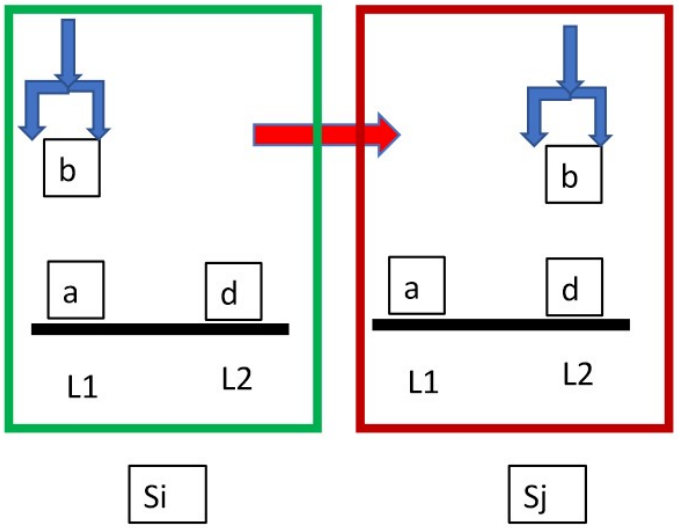
Special Case: Unstack and stack are allowed when two robotic arms hold 2 different boxes at the same time and will be "placed" on two different "locations". Be careful on conflicted scenarios (grabbing, stacking, …). Robotic arms DON'T EXCHANGE blocks.

- **NOOP**: the robotic arm performs no action.

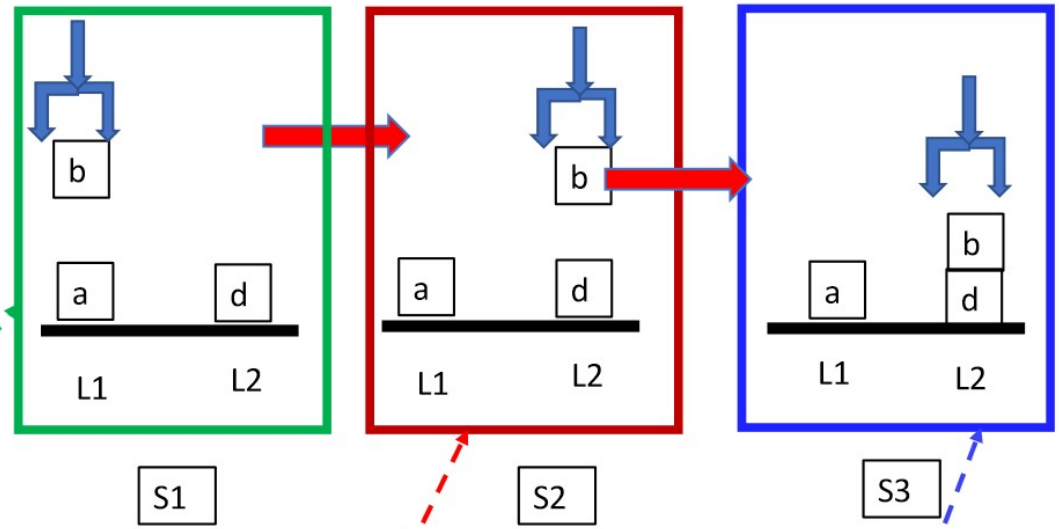
AI Project: 7 boxes example with two robotic arms



A Move action example

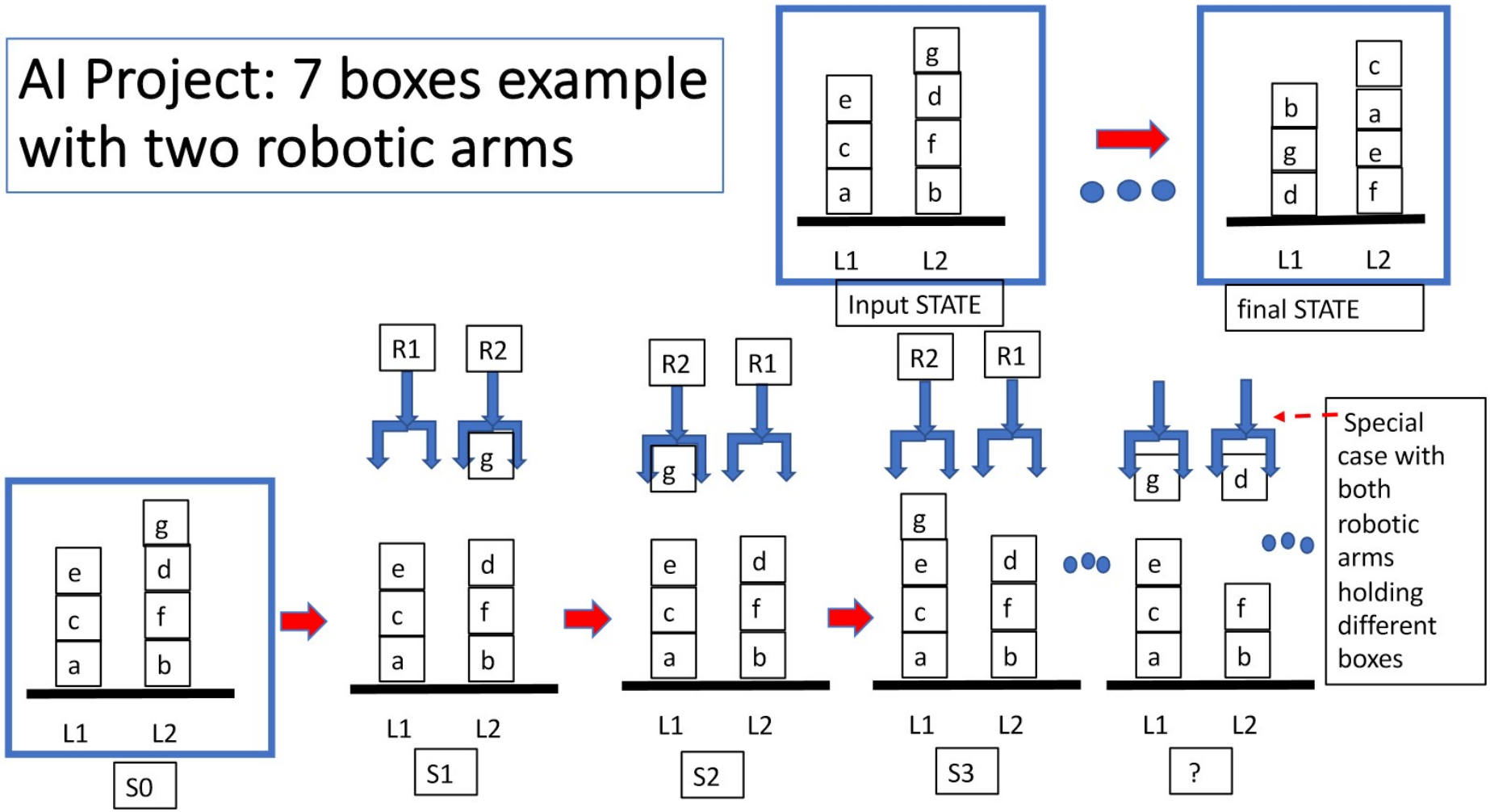


Actions example

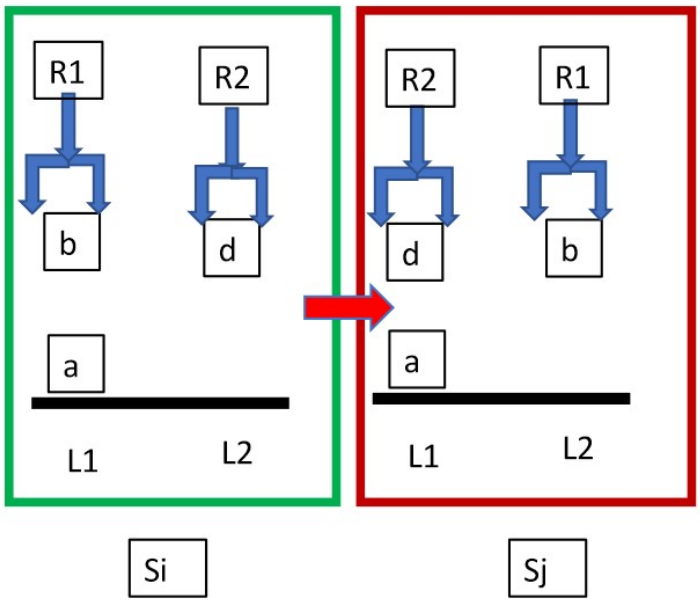


{(U(b, a, L1),S1); (M(L1, b, L2),S2); (S(b, d, L2),S3)}

AI Project: 7 boxes example with two robotic arms



A Move action example



END: Questions