Homework 1

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1 Part A

- The article talks about how deepfakes are having a massive influence on the ongoing war between Russia and Ukraine. The deepfake in the article was the Ukraine President Zelenskyy talking to the soldiers regarding laying down their arms and retreating to their families. So, the article further enhances the dystopian future of deepfakes and how their influence will continue to build.

- One of the major researchers of computer vision and machine learning Siwei Lyu talks about how deep fakes are getting harder and harder to detect. Lyu developed a system to detect deepfakes but overtime inconsistencies like inaccurate blinking have been fixed which make it harder to detect.
  Psychologically, most people believe what they see, so the amount of misinformation that can be created with deepfakes is astronomical. The US election was also slightly hampered due to deepfakes but as they keep getting better, ther influence on major public events will also increase. There can be positive uses for deepfakes such as helping protect identities of whistle-blowers but the negative uses far outweigh the positives. Deepfakes can also be used to give better educational videos as human beings understand better visually so a video of Einstein explaining his own theory will get more attentive students. But the negative implications of deepfakes can be long lasting such as influencing elections, wars, public debates, and many more public events.

- Deepfakes, synthetic videos created where the person in the video is replaced by another, both in voice and face. A recently surfaced deepfake video of Ukrainian President Zelenskyy could've changed the course of the ongoing war so the fears of deepfake are discussed.

2 Part B

- *Losing your Marbles*

  - **Knowledge Base** : There are 3 baskets with marbles in each of them, marbles can only be transferred from one basket to another if the receiving basket's marbles can be doubled. The goal state is when all 3 baskets have equal amount of marbles.

  - Rules :

    * **Precondition** : The transfer of marbles can only take place if the receiving basket's marbles can be doubled

* **Action**: Double the Marbles of the receiving basket and remove the same number of marbles from the giving basket.
  - **Initial State** : All 3 baskets have some number of marbles in them.
  - **State Representation**: [3 , 5 , 7], each integer value of the array can be the number of marbles held by the Basket. So moving marbles from the 3rd basket to the 1st would result in [6,5,4]
  - **Goal Condition** : All 3 of the baskets have the same number of marbles so [5,5,5].

- *Sliding Tile Puzzle*
  - **Knowledge Base** : There are 3 tiles colored black and 3 tiles colored white which are separated by a empty tile. The tiles can jump over tiles only into the empty space. There is a cost occurring based on how many tiles are jumped over to reach the empty space, if the empty space is adjacent then the cost is 1.
  - Rules :
    * **Precondition** :
      · A tile can only jump to an empty space which results in a cost of 1.
      · A tile can jump over multiple tiles to an empty space where the cost incurred is the number of tiles jumped.
    * **Action**: The Tile is moved to the empty space and a new empty space is generated where the tile was previously located.
  - **Initial State** : There are 3 Black Tiles to the left and 3 White tiles to the right with an empty space in the middle.
  - **State Representation**: ['B','B','B',' ','W','W','W'], The White tiles are indicated as a string 'W' and the black tiles are indicated as a string 'B'. The empty space is indicated with an empty string ' ' in the array.
  - **Goal Condition** : All of the White tiles have moved left of the black tiles, the empty space can be present anywhere so for example: ['W','W','W',' ', 'B','B','B']

3 Part C

3.1 NEST

PEAS Table

Agent Type	Performance Measure	Environment	Actuators	Sensors
Thermostat	Makes changes to temperature	Surroundings of the device and other rooms	Mercury vial to check temperature	Temperature Sensor
User Locator	Tracks the user's location correctly	Inside the Device	Location Sensor and Phone's Location sensor	Location Sensor and Phone's Geo-location Sensor
Phone Application	Gives accurate temperature Data to User	Customer's Mobile	Customer's Device	Not Applicable
Wireless Adaptor	Gives Network Capabilities	Inside Nest Device	Wireless receiver	WIFI sensor
Display Enabler	Lights up when user is nearby	Around NEST Device	Lights and Proximity Sensor	Proximity Sensor

Task Table

Task Environment	Observable	Agents	Deterministic	Episodic	Static	Discrete
Thermostat	Fully	Multiple	Deterministic	Episodic	Dynamic	Discrete
Phone app	Fully	Single	Deterministic	Episodic	Static	Discrete
Display Enabler	Fully	Single	Deterministic	Episodic	Dynamic	Discrete
User Locator	Partially	Single	Stochastic	Sequential	Dynamic	Discrete
Wireless Adaptor	Partially	Single	Stochastic	Episodic	Dynamic	Discrete

3.2 Amazon Worker-Free Stores

PEAS Table

Agent Type	Performance Measure	Environment	Actuators	Sensors
Inventory Manager	Keeps track of inventory	The store's aisles	Database	Not Applicable
Payment Card Scanner	Collects User Payment Information safely	Entrance of Store	RFID scanner and Card chip scanner	RFID sensor
Billing Application	Gives accurate bills to user from gathered Data	Customer's Mobile	Customer's Devices	Not Applicable
Cameras	Keeps track of user's purchases	multiple covering the entire store	Camera Holders, Camera Pivots	Not Applicable
Display Enabler	Lights up when user picks up store item	On aisles	Lights and Proximity Sensor	Proximity Sensor

Task Table

Task Environment	Observable	Agents	Deterministic	Episodic	Static	Discrete
Inventory Manager	Partially	Single	Deterministic	Sequential	Dynamic	Continuous
Payment Card Scanner	Fully	Multiple	Deterministic	Episodic	Static	Discrete
Billing Application	Partially	Single	Deterministic	Sequential	Dynamic	Discrete
Cameras	Partially	Multiple	Deterministic	Sequential	Dynamic	Discrete
Display Enabler	Fully	Single	Deterministic	Episodic	Dynamic	Discrete