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HW1

Briefly discuss and answer the following (no more than 200 words for each question):

1. Are reflex actions (such as flinching from a hot stove) rational? Are they intelligent?

Yes. Flinching is a rational act, since leaving one hand on the stove, or for the various other examples that might expose the body to endanger its safety due to the encountered scenario will help the body escape danger. Therefore, since it's the right thing to do in the most efficient manner, the action is rational.

However, reflex actions are not intelligent. To make an intelligent decision, environmental stimulus has to be sensed, processed, potential outcomes outweighed and considered, then best option from prior experience via school or life in general would need be performed in a calculated manner. Thus, an example would be, turning off the stove instead of flinching.

2. Why would evolution tend to result in systems that act rationally? What goals are such systems designed to achieve?

Modern (Western) Science that birthed from Darwinist theories into evolution would reason that rational systems resumed their existence on earth while the ones that couldn't keep up withered away. Using this reasoning, living systems, for example, that have been seen to do the "right thing," or make selections in a competing world which better usurp their surrounding have been seen to exist longer in life and surpass all the hurdles the world throws at them be it weather, catastrophe, habitat issues and the like. So, since these systems are designed to encourage reproduction of a given specie, adjust with their habitat and any changes they encounter, beat other beings in competition of resource, and the like, the most rational decision have been seen to help in evolution favoring one specie over the other.

3. Investigate the state of the art for domestic robots that fold laundry. Is a commercial robot available? What are the shortcomings?, etc.

There are couple of robots that fold clothes and have been shown on market. They are either human assisted ones, that need people to hand them an item individually in a predetermined configuration or fully autonomous ones. Nonetheless, folding laundry has been a challenging task for a given robot to execute automatically as breaking down the task to small executable chunks that can be performed repeatedly has been difficult for the engineers to program. Some hopeful companies, such as the FoldiMate, though gave hope, soon dwindled and not seen on market anymore. Main challenges are the complex configuration space various clothes are placed in as the starting phase as well as the highly non-linear dynamics of deformable objects. Although current existing two

arm robots have increased the speed at how many items they can fold per hour, they are still slow to be implemented in daily home or manufacturing settings.

"The fastest ever laundry-folding robot is here. And it's likely still slower than you" by Rachel Treisman. Published in NPR.org, 22.10.2022, https://www.npr.org/2022/10/22/1130552239/robot-folding-laundry

4. True or False? A perfectly rational person always carries an umbrella if it is raining. Explain briefly.

False. Depending on how that person is traveling he/she may not need to carry one, ie that person can in a public or private vehicular transformation, might be sitting inside a residence, might be walking wearing a raincoat or sheet fully covering their body, or could have their friend or someone else holding the umbrella for them.

Update: after comments on lecture

Answer can be True or False based on what is rational. Rationality is based on utility. So, for someone outside exposed to rain, the chances of him/her carrying umbrella depends on how that individual defines to be the happiest or most rewarding outcome. If the individual is a kid or a group jogging activity designed to exercise in the rain, they might prefer not carrying an umbrella since they prefer to get wet. On the otherhand, if that individual is walking to a wedding and don't want their outfit ruined by the rain, since he/she don't want the risk of getting wet by rain they might carry the umbrella although the weatherman tells there wouldn't be, they might still carry.

5. True or False? Machine learning algorithms employ a deductive method to learn a model from data. Explain briefly

False. As the Artificial Intelligence book by Russel and Norvig defines machine learning as having the capability "to adapt to new circumstances and to detect and extrapolate patterns." Therefore, this describes inductive reasoning which uses the few data or knowledge learned by a system to define a wider and general phenomenon. As a result, one can say the ML algorithms work to characterize the area in study based off of the minimal data they have.