Theory of Designing Artifacts

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Topic:

1. Pick up an example of mode recognition error experienced when using daily products around us, and explain the discrepancy between a machine model and a user model occurring there.

2. Take an example of a case where human judgement and decision of automation conflict and state which one should be given priority. Along with its basis, also list each of the advantages and disadvantages of human judgement and machine judgement and state how they should cooperate.

Essay:

1. Take google map as an example, which links the user intention only with the destination but not the activities behind. Here is how the google map works: type in the destination and it will automatically categorize the path based on different transportation and list them up in accord with time the price. Efficiency is the only standard for its path recommendation within the human mode of google map. But to my understanding, the activities behind should be paid more attentions instead of the destination itself. And we can easily tell their difference with an example of path recommendation for visitors, in which a visitor may prefer a path with more beautiful view instead of arriving the final site as soon as possible.

2. Take a shared-driving car as an example and firstly consider the conflict between the different judgments of the environment. For one case, a driver drives a car to cross an intersection without noticing the traffic light having turned into red. At the same time, his intelligent car notices and regards it as a dangerous situation and plans to take some actions. For another case, the same driver takes a rest when its car drives autonomously to cross an intersection. With a limited intelligence, the car doesn't notice a horse on its right side and continues to turn right. The driver notices and plans to take the driving right back. Besides, there may be a conflict between the different judgments of the each other. With the same situation of the horse case, the car notices its limitation and plans to adaptively give the driving back to human with an assumption that the human driver can handle the case. But actually the human has no idea of the external environment.

   As for the priority, it is easy to tell with a fully observation of the environment and enough rationality and intelligence. However, it is impossible in our realistic life. So according to different assumption and approximation, the human robot collaboration can be divided

into three types: robot adaptation, human adaptation and mutual adaptation [1]. 1) Based on the assumption that human is a perfect collaborator, the goal of robot agent in the robot adaptive system is to follow the human preference. 2) Whether robot can generate the routes and indirectly affect human actions is the problem human adaption wants to consider, in which the robot leverages its actions to guide the person to perform better in some certain case. Finally, different from the above leader-assistant teamwork model, human and robot are required to mutually adapt to each other in mutual adaptation.

Along with the mutual adaptation case, a proper way to combine the advantage of human and robot and avoid their disadvantages is necessary. There is no doubt that human is more intelligent in creative job, which includes the capacity to transfer higher level knowledge and apply it to a new case. But at the same time, human is much more uncertain to a learned problem. And with the development of sensors and some other technics, robot/computer is more competitive in some certain tasks like large perspective detection.

It is easy to conclude that the communication between human and robot is a key of the mutual adaptation, which means human and robot should share their knowledge of the environment and understating of each other while cooperating. But it has to be mentioned that finding a proper way to communicate is as easy as our imagination.

Reference:

[1] Stefanos Nikolaidis et al. Mathematical models of adaption in human-robot collaboration. arXiv. 2017