Workshop on Novelties in Open World

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Abstract

Novelties are surprises that a system encounters. System must learn about the characteristics and detect, understand, and adapt to novelty in not only the environment but in agents that interact with it. The context, timing, duration, extent, duration of novelty must be considered in agent's adaptation and accommodation. There is a need to build AI/ML systems that can adapt to fluid novelties in the open world.

This workshop will contribute to scientific principles to quantify and characterize novelty in open-world domains. It will attempt to develop measures and evaluation criteria for behaviour of AI systems. The workshop will feature 3-4 speakers but we invite the participants to think and make contributions towards this problem during the workshop.

1. Motivation and Plans

Novelties are found in many environments and agents must learn about them and accommodate them. We list a few examples to provide understanding and a basis for discussion during the workshop.

Examples of Novelties :

- A car going on a steep hill in dark, rain. The car is not on the main road. Main road on flat terrain, good weather will be normal. Steep hill, darkness, rain/snow and road with weak soil, vegetation will be novelties.

- Second example is a person from the USA driving in India. Many novelties occur: no stop and yield signs, left hand drive, mix of traffic vehicles (bicycle, rickshaw, horse/bullock/oxen driven carts, scooters, three wheeler, along with trucks, buses) and narrow single lane roads and unpaved roads. How can the driver (or drivers) visiting from the USA train, learn, and adjust to drive safely in India.

- A third example is cheating or sudden change in the rules of playing games such as chess, basketball, monopoly while the game is being played.

- A fourth example is attacks, malicious activities and threats cyber or otherwise. How can a child or older person deal with novelties of pickpockets, scoundrels, thieves, purse snatchers, etc.

How can a system continue to operate in unknown adverse conditions and situations such as collaborative attacks in cyberspace?

- A fifth example of novelty is a man walking with a cat (dog will not be novelty) or rhinoceros (elephant or horse is not a novelty).

- A sixth example of novelty is big animals roaming an urban area such as the street of San Francisco or Manhattan (NY City) freely on roads and highways.

- A seventh example will be a very expensive car parked in front of a house in a poor neighbourhood or a really damaged/old car being driven by a billionaire.

Participants need to think of levels and categories of novelties. What are various ways the novelties can be formalized so as to represent them in a language that can be understood by an AI system and a good user-interface can be created. Research is needed to identify novelties that can be ignored (they have no impact on achieving the objectives of a system), can be tolerated with little damage or need immediate response. We need to think of algorithms for AI systems to accommodate novelties and mediate between agent's actions and unknown/unexpected novelties so that the task for actions is successful. We need active participation from researchers working in AI/ML and semantic computing to make the workshop successful.