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Project report

Strong artificial Intelligence

Introduction

In the actual world, AI will be the pillar in the future. By the google search engine, this term has been search from XXX in 2004 to XXX nowadays. But this term is really talking about “intelligence increased” et not AI (ref L.Julia). If this time, we compare “Strong Artificial Intelligence » on the google search engine, we obtain XXX between 2004 and XXX to nowadays. This variance can be explain because people don’t use the right term to use it.

Many personnal assistant are used with the word “IA” like google assistant, Siri or Alexa. What is a virtual assistant ? According to the article written by J. Casset and C. Pelachaud, there idea is to create an intelligence that will be able to interact like a human that will lead to a communication and an advanced relational. [<https://arxiv.org/pdf/2002.02450.pdf>]

Regarding to google assistant, each interaction done by the assistant modelized with an “Action” [<https://developers.google.com/assistant>] built by the developer. For Siri, XXX. And for Alexa, it is a “Skills” [<https://developer.amazon.com/fr-FR/alexa/alexa-skills-kit>] also built by a developer. Our goal is to create a strong artificial intelligence as a personnal assistant which will called SAI (Strong Artificial Intelligence). As L. Julia said, “ we are far away from build a real artificial intelligence”, that is why, focus on the subject the fast as we can is the best option.

The objective of this virtual assistant is that it will be more environmentally-friendly that thoses avaibles. The other assistant required generally a cluster that needed a datacenter. Which leads to gaz emission with significant impact. The outcome must be light to keep the computer worked correctly.

Our main idea is to use reinforcement learning to allow our virtual assistant to interact with a natural way. The asset of this learning is that it will be dynamic as Maria A. Zualaga show us at the conference Sophia Summit 2019 where this dynamic learning [cite B. Lubars, Chenhao Tan] has been done with medical data.

We will test this approach by developing a datawarehouse to dynamically interact with virtual assistant. We will need to pre-register the sounds that allow virtual assistant to know if it will be on the right way or not.

Regarding to the voice, we will only use the test person voice. It will use to train the algorithm. Each pre-registered sounds will reflect the reward or the penalty that the program need to feel when the person is talking.

For the mouse and keyboard control, our algorithm will try random actions as a script which will be evaluate by the testing person while using the voice.

The main goal is to command the mouse with the voice. Each speech intented to the virtual assistant will trigered a communication process in case of misunderstanding [Cite J.Lieu and Al] to know more about the action or do the asked action.

Related work

In the work of A. Sarkar, strong artificial intelligence is possible using reinforcement learning. That is why trying to implement it is a good option [<https://arxiv.org/abs/1803.02912>]. Then, according to the J. Lieu and Al work, the reinforcement learning used with another method kind could be used to solve the limited memory usage problem by our algorithm [<https://arxiv.org/pdf/1908.11494.pdf>]. In response to the work of A. Knight, we must implement an algorithm which could answer to the quetsion that it musn’t assume to answer by an algorithm [<https://arxiv.org/ftp/arxiv/papers/1906/1906.10177.pdf> The research done will looks like those which is done by Q.Debard and Al on the interactions between users and touchpad on 2D and 3D environment. [<https://arxiv.org/pdf/1904.07802.pdf>]

RL in game (alpha go) with image

Dataset and features

The dataset is composed of different interval records of image. It begins from 1 minute, to 10 minute, to 1 hour to 1 day. In each recording, for every second our algorithm will record between 10 and 20 images, we try to the behavior of the human eyes which can see 26 images per seconds when he looks at a monitor.

For each image record, we will transform for each seconds some object that will permit to compress the image on the memory. For example, we record 20 images, in those 20 images, 80 % pixels of the images still to be one single image and the 20% other pixels represent the changement of the image during this second. Normally, we have 20 \* 4 Mo image in memory, now we obtain 1 \* 3.6 Mo and 20 \* 0.4 image. This new dataset is really better in term of memory usage.

The second dataset used is composed of sounds recorded. Each sounds represents the meaning of “yes” and “no”. Our algorithm will understand what it will listen accorting to this dataset and we will use dynamic training of RL.

Dynamc dataset

Methods

The approach I choose to do here, it seems like reinforcement learning because the algorithm will try random behavior to do things. We call this the pre-training. Then, the user need to choose the training manually using the pre-training done by the algorithm. After the training, our program will understand what we said to it and will do the right action in theory. For example, during the pre-training, we obtains some choice like “a gift showing the action done” and we need to associate the action to a sentence.

The benefit of its approach is that our algorithm will dynamically learn things and save data in a connected database.

RL on dataset to understand the command and to find a new command

Experiments/Results/Discussion

For the first comparaison, we will try some basics command we can tell to cortana, then we will try them on SAI. The commands to test will be for example “move on the left then click on the first object”.

To compare the power used by the two method we need to find a library to test that on Python.

As we can see here, there was some difference about the power consumption. I can add that we need another variable to measure that difference. This variable has to be the internet connection used. So we need another library that catch the internet connectio

Now, we understand that the consumation of internet connection and power seems to be really less with (X) that (Y). We can explain it with the fact that the algorithm [Z].

For the last experiment, we will compare the memory space used by our algorithm and the others.

There was clearly a huge difference between those results. We can explain that with (A).

Compare the power used by the two methods

Explain the results

Use the different record to do stats

<https://arxiv.org/pdf/2002.01359.pdf>

This time we will compare the commands of SAI with Cortana. Using the differents command we obtain those curves. [curves]

As we can see here, SAI seems to be better than Cortana to do the differents command. [Other explanations]

Discussion

I create a first version of SAI, that can do some basics commands. Those commands seems to be basics but they are really useful for the future commands we will teach to it.

It is important to understand that the algorithm learn the command because the user teach it, it is not the developper which program the algorithm.

It means that our algorithm seems to associate a strategy to an action. It is the first step of the thinking of an artificial intelligence. It creates its own understanding using rewards or penalities.

How the results compare to what you expected, why ?

How the results compare to other researchers, why ?

What question, we need to ask next ?

The question we need to ask next is “Can we add a lot of commands and will the algorithm will understand again ?”

Find something useful the researcher readers can learn about the work

According to this work, the next step is to create the “human thinking” using this dynamic reinforcement learning method.

Future Work

For the future, SAI needs to be launch every time the corresponding computer is up. It means that it will be “alive” and can do command anytime we ask to it. It means that we should be prepare to managing multiple records at the same time.

To communicate with us SAI will need to generate an output as a voice that human can easely understand.

Moreother, the algorithm will create a profile for each sounds it will listen. Actually, our algorithm can only understand the person that use dynamic reinforcement learning. This time, it will understand each person and classify them on his “mind”.

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