Open Intelligence:

An open source Artificial Intelligence research and development project

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While many artificial intelligence (AI) projects work on creating a neural network to simulate a brain, I would like to propose a psychological perspective. While building a simulated structure of the brain is important, it is mainly important for the neuroplasticity and organization of the brain. It is a platform for the mind sit on, but a brain without the mind is no better than a computer without an operating system.

AI development would benefit more from understanding human psychology, because this would tap into understanding the human mind, not the brain. By simulating how the mind works, you are building an operating system, giving the program human-like functions. The means of doing so involves the most basic elements of psychology, such as understanding the process of thought and action, the meaning of words, and being able to understand the world through contrast and comparison.

The Process of Thought

The process of thought and action can be broken down into six steps: Stimulus, Observation, Thought, Plan, Action, Verification.

1) Stimulus

The external or internal signals that get picked up by the individual act as stimulus. Essentially, they are inputs, which can be linked to the output at the end of the cycle of verification, since a result can become the stimulus, causing another chain of thought. An example of this phenomenon is most commonly seen in research, where more questions get generated from the original question in the initial experiment.

2) Observation

This step is important because this is the attention that the AI gives to the stimulus, using analytical methods to compare and contrast past data (memories) from other stimuli.. Attributes get attached to objects in this stage, and differences are distinguished through pattern recognition. This is done for every stimulus, and should happen quickly and automatically. The methods of comparison include statistical analysis and other forms of comparison studies Some observations take longer than others, but will not be determined until the Plan stage, if necessary. All data then gets fed to the thought stage for approval.

3) Thought

Most thoughts that occur in the human mind are disregarded as many stimuli are unimportant. Threshold levels need to be set to disregard noise or useless data. The Thought step serves as a priority organizer that looks at the information provided and decides to either disregard it (do nothing), go straight to action, which can be instinctive (fast reaction) or gradual (low priority), or start the planning stage (requires more information).

4) Plan

Planning is the gathering of information, and running of simulations to get the best result for a course of action. This step will involve looping back through the Stimulus, Observation, and Thought steps, while also simulating possible outcomes if the individual takes action. Humans call this thought experiments. The result of this step should be an ordered list of instructions that the AI will take, which will get passed to the Action state in this fashion.

5) Action

This is the actual output that the AI will have, or the actions that it will take. This should be the end result of the Stimulus, Observation, Thought and Plan steps. No further calculation is done in this step, for it should already be finished.

6) Verification

This step is important, for after the action is performed, the AI verifies the response and compares the actual result to the expected result. If satisfied, this gets recorded to memory, allowing the AI to access it easier in the future. This is how it will learn new things, and gain new experiences.

The Human Eye - Functionality and Translation to an AI

The way a human is able to process an image is twofold. The first has to do with the mental capabilities of the occipital lobe, and the other has to do largely how the eye is set up, and what images are actually passed to the brain for processing. The amount of data is very minimal, since our vision is extremely different than that of a webcam.

The first obvious difference is that humans have 2 eyes, creating stereo vision which helps with depth perception. While you can just add two webcams, what must be discussed is the Depth of field of the eye (caused by the iris), and your actual clear vision compared to peripheral vision.

Depth of field is a very interesting "censor" for the brain, as whatever distance is looked at is focused on, while the rest becomes blurry. The easiest method to create this Depth of field is to have a telescoping lens that adjusts the focus mechanically, which is essentially how the eyes work. This can also be done post-image processing with libraries such as OpenCV and others, but will most likely require a sensor that can tell depth such as infrared or ultrasonic. The other method is using trigonometry, as there are programs (especially mobile apps) which calculate it this way. Whatever method, depth perception is needed to censor out background and foreground noise from the processing.

It is known that the human eye can only focus on one thing at a time, but the amount of view that the eye can see is surprising. 5% is perfectly clear , which is the very center of your focus. Approximately 18% of the vision surrounding the center is considered your clear vision. This is actually the total area that your brain processes, and this is where your focus lies. Everything else is peripheral vision, getting progressively blurrier the farther away from the center you go.

So in total, the amount of visual information that gets passed and processed critically to your brain is actually just 18% of the center image at a specific Depth of Field. Everything else, your peripheral vision, is glanced at by your brain to check for anomalies or significant objects. These consist of contrasting colors, fast moving detections, suddenly close objects, or anything that is considered "new" and "odd". When this is found, we turn our eyes, bringing it into that 18% Depth of Field image to actually process the information.

Other things worth mentioning is the how Field of View works with human vision. Quoting from Wikipedia (not a credible source, though it checks out based on personal observations) "The approximate field of view of an individual human eye is 95° away from the nose, 75° downward, 60° toward the nose, and 60° upward, allowing humans to have an almost 180-degree forward-facing horizontal field of view." This is made possible from the morphology of the face.

To break down the quote into steps, first it mentions "95° away from the nose ", which is because there is no obstruction on the left and right of your eyes. "75° downward " is this degree since your cheekbones blocks the rest of the vision. "60° toward the nose " is caused since your nose and nose bridge obstructs the rest of the vision, and the same with your eyebrow ridge for "60° upward ". This has its purpose also, as if we were able to see full 95% for all sides, there would be a lot of data flowing into our brain, as well as conflicting angles due to the fact that we have a left and right eye working together. If our left eye saw everything our right eye can see, and vice versa, we would most likely become confused with the conflicting data coming into our brain.

Words and the Mind

While the process of thought is essential, words are equally as important to the mind. It is known that human beings think with words, and the mind gets developed through understanding the words that we communicate with. We come to know these words through the characteristics attached to them, and these attributes are found from the process of thought mentioned above. This is how words resonate with us, because these characteristics connect with the senses, and invoke stimuli as if that word was manifested as a real entity.

To understand how this happens, we need to establish grammar and break down how sentences are constructed, and the purpose of each word within a sentence. If we do this, we can then pass a sentence to the AI, which will break it down and analyze what was said, converting the information presented as stimuli, and through the process of thought the information will become incorporated.

As it turns out, sentences are constructed in a very logical manner, and the direct definitions of how grammer is used can be translated almost directly into code for the AI. For example, lets take the sentence, "The cat is grey". Breaking down each word, the word "THE" is a declaritive word, almost like preparing for an object or directive in the next word. Following "THE" is "CAT". In the beginning, the AI (just like a baby) will not know what "CAT" is, therefore it will be left as an open definition, or perhaps a class element. The word "IS" states that "CAT" contains a property, which will be set in the next word. Finally, the word "GREY" is another word that is unknown to the AI (until learned), but it knows to place "GREY" as a property of "CAT".

The AI now knows that "CAT" is "GREY", so if we feed a statement such as, "This is a cat." (and show a picture of it), The AI will take this image and associate it to the class CAT. As you further talk about cats, and show images and behaviors of cats and so forth, the AI will keep adding these properties to the class CAT until it has a rather complex idea of what a cat is, and this is essentially how humans learn. We learn through observation and comparison.

But still, in the previous statement, we know what a cat is, but not what grey is. If we now pass the statement "Grey is a color", the AI will make the class GREY inherit the class COLOR. Through this inheritance system, we can organize the AI's thoughs so that it knows what belongs where, and also help with memory reduction since it can just inherit the properties of the large group. (This inheritance system also applies to the cat example above.)