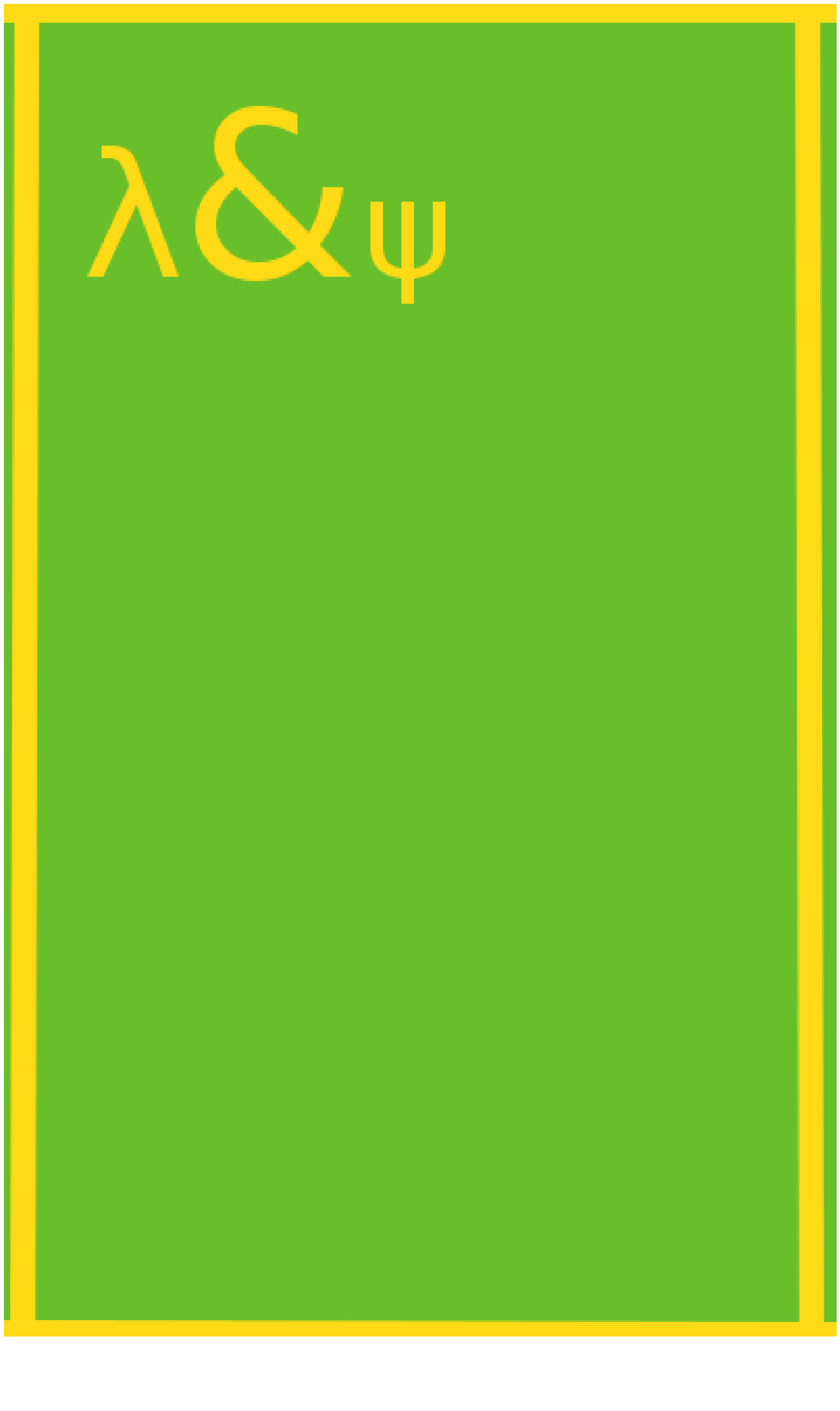
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Naive Idea Theory

Uladox

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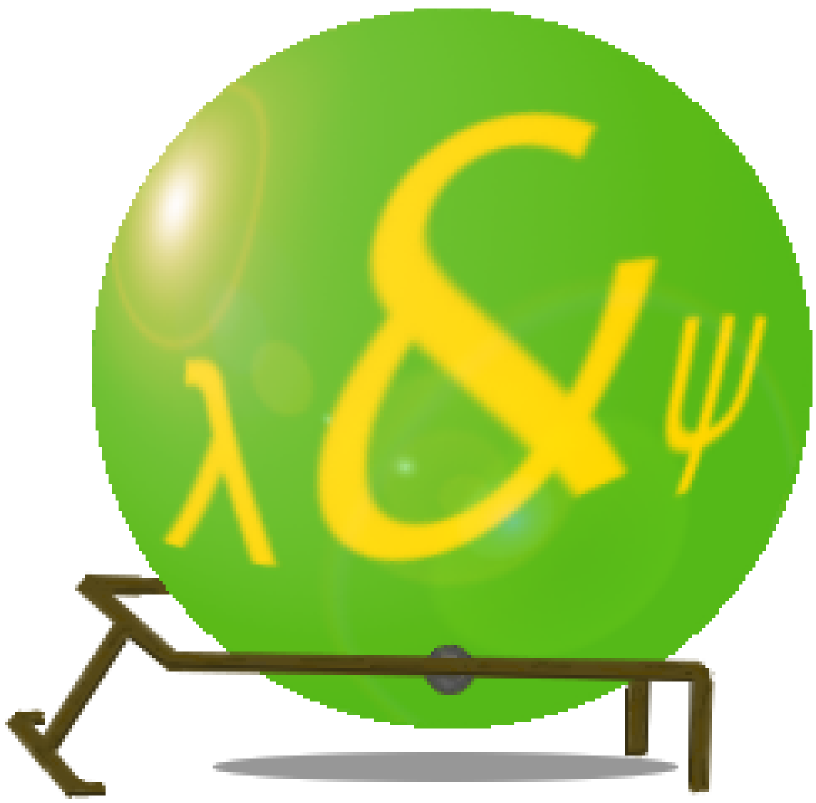


1 Episode (aka version)

"Prolonged Prologue"[1]

2 Introduction

There are many approaches to artificial intelligence. Each one has its distinct advantages and disadvantages. The approach in this theory is no exception to this rule. The approach taken here is that "thinking machines" should be similar to chemical reactions where there is a natural tendency for certain things to form from what is given. Still chemical reactions need a certain environment in order to work, any cell biologist will tell you that things

[1] Code names are tropes, it's sort of a dumb in-joke

such as temperature and pH can cause many reactions to fail. Added to that, enzymes can encourage reactions (such as by speeding them up) and be stopped by inhibitors. These enzymes, solution, and inhibitors might be thought of as a "context" of sorts. Here the view is that "ideas" take on a "natural" composition with the help or discouragement of the "context."[2]

3 For viewing in an org file

Ignore this part if you are reading this in a html document, pdf document, or any other document that does not end with ".org"

- Reasonable scale for org mode readers.
- On Arch Linux I needed to install imagemagick, texlive-core, texlive-humanities, texlive-fontsextra, and texlive-pictures to get things working. I also added to my .emacs file:

```
(eval-after-load "preview"
  '(add-to-list 'preview-default-preamble
"\\PreviewEnvironment{tikzpicture}" t))
(setq org-latex-create-formula-image-program 'imagemagick)
```

4 License

5 Basic Naive Idea Theory

5.1 Properties

In Naive Idea Theory, ideas are distinguished by their properties.

[2]This is an analogy, don't take it too seriously.

5.1.1 Examples

A baseball might have properties such as:

- *held*, since it can be held.
- *thrown*, since it can be thrown.
- *caught*, since it can be caught.

5.2 The $\Rightarrow$ relation

Denotes for $A \Rightarrow P$, P is a property of A. Also it might appear in a set such as $A = \{\Rightarrow P\}$ in order to denote that the set A has the property P.

5.2.1 Examples

- $Baseball \Rightarrow held$ can be read as a baseball can be held.
- $n \Rightarrow (= 5)$ can be read as n can be equal to 5.
- $n \Rightarrow (\approx 5)$ can be read as n can be approximately 5.

5.2.2 Expanded

If a set theory approach is chosen, $A \Rightarrow P$ might be read as $(P \in A) \vee (P\ is\ a\ property)$

5.3 The $\Leftarrow$ relation

Denotes for $P \Leftarrow A$, $A\ fills\ in\ the\ property\ P$. Also it might appear in a set such as $B = \{P \Leftarrow none\}$ or $B = \{P \Leftarrow\}$ to denote that B can have a property but does not.

5.3.1 Example

$S = \{holds \Leftarrow spear\}$ can be read as $S\ holds\ a\ spear$.

5.4 The τ function

Is defined such that

- $\tau(A, B) =$ if B has a property that A is compatible with, then fill in said property of A with B, otherwise return the empty set.

5.4.1 Example

- $person = \{holds \Leftarrow\}$
- $spear \Rightarrow held$
- $\tau(person, spear) = \{holds \Leftarrow spear\}$

5.4.2 Expanded

$\tau(A, B) = \{if\ \exists_{P_A}(a = (P_A \Leftarrow)) \vee (B \Rightarrow P_A)\ then\ (P_A \Leftarrow B)\ else\ \emptyset\ |\forall a \in A\}$
or, on several lines

$$\tau(A, B) = \left\{ \begin{cases} (P_A \Leftarrow B) & \text{if } \exists_{P_A}(a = (P_A \Leftarrow)) \vee (B \Rightarrow P_A) \\ \emptyset & \text{otherwise} \end{cases} \middle| \forall a \in A \right\}$$

5.5 The θ function

is such that it exhaustively goes over a set or some other structure that can contain things and applies τ to all pairs in the structure. The θ function has a complexity of at least $O(n^2)$.

5.5.1 Example

$$\theta\left(\begin{Bmatrix} spear \Rightarrow held, \\ \{name \Leftarrow Bob, holds \Leftarrow\}, \\ \{name \Leftarrow Alyce, holds \Leftarrow\} \end{Bmatrix}\right) = \begin{Bmatrix} \{name \Leftarrow Bob, holds \Leftarrow spear\}, \\ \{name \Leftarrow Alyce, holds \Leftarrow spear\} \end{Bmatrix}$$

5.5.2 Expanded

1. In set theory with logic $\theta(S) = \{\tau(A, B) \mid \forall a, b \in S\}$
2. Or with the Cartesian product $\theta(S) = \{\tau(C) \mid C \in S \times S\}$

5.6 The $\oplus$ function

- filters out things that do not work according to a context. This might be represented as two sets where the first set is the set of "restrictions" and the second set is the set the "focus" of things to restrict. The restrictions" contains relations that are not allowed (for example a color can not have the property of being held so *held* $\Leftarrow$ *color* in the "restriction" set would represent this). The value returned by the $\oplus$

function might thus be the set of elements in the "focus" that are not disallowed. In which case the $\oplus$ function has a complexity of at least $O(n_1 n_2)$ where n_1 is the number of elements of elements in the "restriction set" and n_2 is the number of elements in the "focus" set.

5.6.1 Example

- With

$$\begin{array}{lcl} Scythe & = & \{name \Leftarrow Scythe, \Rightarrow held\} \\ Skeleton & = & \{name \Leftarrow Skeleton, \Rightarrow body, \Leftarrow holds, \Leftarrow wears\} \\ Rat & = & \{name \Leftarrow Rat, \Rightarrow body, \Leftarrow holds, \Leftarrow wears\} \\ Robe & = & \{name \Leftarrow Robe, \Rightarrow worn, \Leftarrow holds\} \end{array}$$

- Therefore

$$\theta(\{Scythe, Skeleton, Rat, Robe\}) = \left\{ \begin{array}{l} \{name \Leftarrow Skeleton, \Rightarrow body, Scythe \Leftarrow holds, \Leftarrow wears\}, \\ \{name \Leftarrow Skeleton, \Rightarrow body, \Leftarrow holds, Robe \Leftarrow wears\}, \\ \{name \Leftarrow Rat, \Rightarrow body, Scythe \Leftarrow holds, \Leftarrow wears\}, \\ \{name \Leftarrow Rat, \Rightarrow body, \Leftarrow holds, Robe \Leftarrow wears\}, \\ \{name \Leftarrow Robe, \Rightarrow worn, Scythe \Leftarrow holds\} \end{array} \right\}$$

- So if we only want to rule out clothing holding holding things so, which might not make much sense in a hypothetical context or not be worth considering

$$\oplus(\{worn \Leftarrow holds\}, \theta(\{Scythe, Skeleton, Rat, Robe\}) = \left\{ \begin{array}{l} \{name \Leftarrow Skeleton, \Rightarrow body, Scythe \Leftarrow holds, \Leftarrow wears\}, \\ \{name \Leftarrow Skeleton, \Rightarrow body, \Leftarrow holds, Robe \Leftarrow wears\}, \\ \{name \Leftarrow Rat, \Rightarrow body, Scythe \Leftarrow holds, \Leftarrow wears\}, \\ \{name \Leftarrow Rat, \Rightarrow body, \Leftarrow holds, Robe \Leftarrow wears\} \end{array} \right\}$$

  - (Notice the last elements of the sets being the difference)

5.7 The $\odot$ function

computes for the simplest "thinking machine" in Basic Naive Idea Theory. It that takes in a triple of the "focus", "parts", and "restrictions" and returns a triple with the same value for "parts" and "restrictions", but the "focus" is different. It is easily defined as $\odot(f, p, r) = (\oplus(r, \theta(f \cup p)), p, r)$.

5.7.1 The upsides

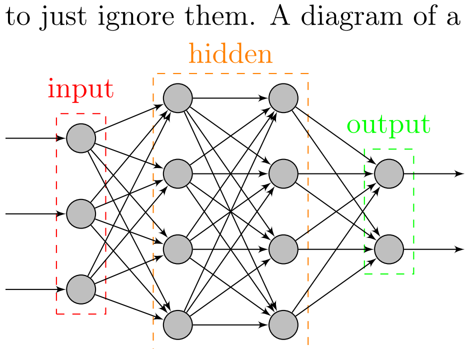
An $\oplus$ function based "thinking machine" can be easily defined in such a way that it constructions new and complex relations in some meaningful way and can have the "restriction" and "parts" changed in order to deal with different contexts.

5.7.2 The many many problems still in place

- There is a very high computational complexity (at least $O(|f \cup p||r|)$ which is unreasonable for any moderate size of f, p, or r).
- The "thinking machine" still has to be told what to "think" (f and p) and how to "think" (r and p).
- There a lack of the natural tendency of a "fuzzy" or numeric amount of how much an idea is liked, with it instead either getting thrown out or kept.
- No way to learn about new properties.
- No way to learn about the relationships between properties or and other properties or "prototypes" of properties.
- No personality.

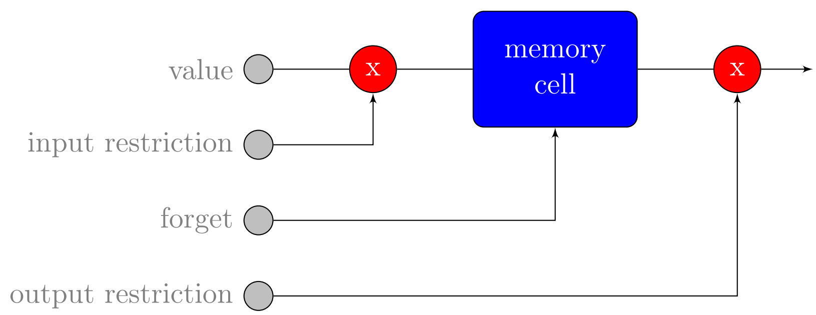
6 Side note on artificial neural networks

In the world of artificial intelligence neural networks are becoming harder and harder to ignore. Many difficult problems have been solved using them such as reading written words and pole balancing. While Naive Idea Theory does not use neural networks for reasons explained later, it would be foolish to just ignore them. A diagram of a neural network might look like:



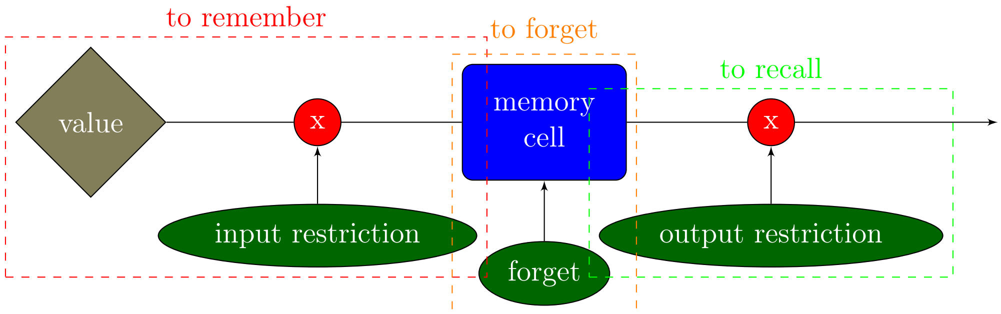
So, what actually is this? There are many great resources online for artificial neural networks, so we won't focus on too many details irrelevant to Naive Idea Theory. What we will focus on is what a node in the network is. It might seem obvious that it is a representation of a neuron, but that is not the whole picture. A node is a property and the value that it returns is its degree of truth.[3] An example for reading writing is that an input node represent the property of darkness for a pixel and an output node represents it closeness to the image being a letter. Hidden nodes also represent properties, but in practice we often don't know what for (however we almost always know what properties the input and output nodes represent, with the biggest exception being when the networks are part of a larger network and/or genetic algorithm).

6.1 Long short-term memory



A particularly useful neural network when it comes to time series is long short-term memory. A good way to picture how long short term memory works is with the whole long short-term block as a property that can save its degree of which it is true (e.g. how much is some data like a letter) because it might be needed later. The first node is the value of truth we might want to remember, the second node can decrease it if it is such that it should not effect future steps much (blocking that value from entering into the next layer), the third node can forget (i.e zero out) the value, and the forth node can make the value have little influence when it is output (you could think of this as whether it is output at all, since if it near zero it gets zero and when it is near one it is the value). To avoid confusion, just because a value is output from the memory cell does not necessarily mean the memory cell forgets it.

[3]There are so many different types of neural networks these days that this probably is not entirely true.



6.2 So how does this relate

Time Naive Idea Theory has networks that are similar to standard artificial neural networks, except with some important differences.

- One of the biggest differences between Timed Naive Idea Theory networks and artificial neural networks is that properties are not tied to the network's topology, but instead freely flow.

- Nodes might run concurrently meaning more nodes should not slow the network.

7 Timed Naive Idea Theory

7.1 It's about time!

- There's a time and place for everything.
- It's time to get going.
- I don't have that kind of time.
- Talk about timing.
- Where has the time gone?
- The best and worst of times.
- Ahead of their time.
- Time goes by fast when you're having fun.

- The seconds dragged on...
- All good things come to an end.

7.2 What we mean by time

Do not take anything here absolutely seriously, it is just my philosophical rambling about how a sense of time might work. For this paper it is important for a sense of time to be represented, so my **very very untested** model with have to do. The type of time we plan to deal with is not the time we deal with in physics problems, but more like the time of an internal clock telling you what needs to be done. Time here refers to a perception of time, which is just as the name implies, a perception.

7.3 When is the time right?

How do we know when it is a time to sleep, a time to eat, a time to cry, a time to know, a time to pretend, a time to sigh, a time to read, a time finish what must be done, and a time to give up?

7.4 Rephrasing the problem

Say $\mathbb{T}$ is the set of all times. So how would we map from this set at any given moment to a specific time? We could image a 12 hour clock[4] as a mapping from a subset of $\mathbb{T}$ containing twelve times to a single one of those. So what determines what time evaluates form this mapping? Well, time. That is confusing, so we will denote this time that influences the result of the mapping as a member of the set of $\mathfrak{T}$. With this in place a clock might be represented as:

- A triple (f_t, S_t, T_1), with $S_t \subseteq \mathbb{T}$, $T_1 \in \mathfrak{T}$ and a function f_t that takes in the triple and returns a pair containing a triple that can be reused with f_t and a time t,
- Such that $f_t((f_t, S_t, T_1)) = ((f_t, S_t, T_2), t)$ with $T_2 \in \mathfrak{T}$ and $t \in S_t$.

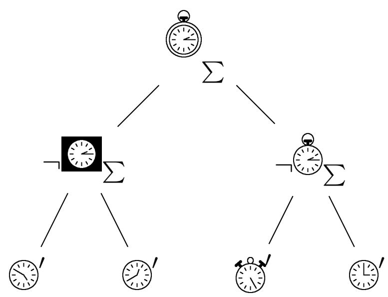
[4]I know, it tells a different definition of time then what we are working with, but pretend that instead of hours and a constant increment of time we are dealing with some arbitrary set of times and some other mechanism for changing from one to the next..

7.5 Proper timing

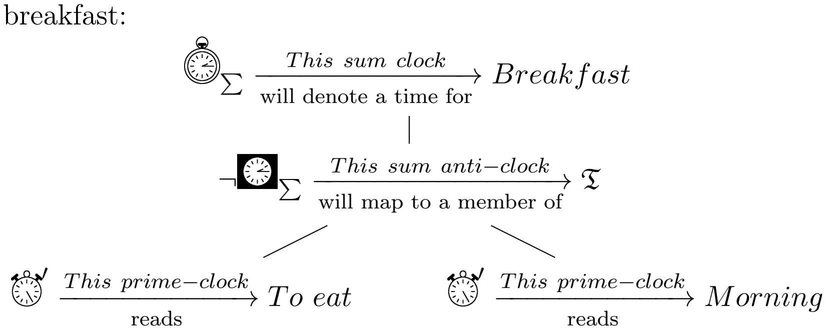
Now the question becomes what values to choose for S_t, T_1, and f_t in order to deal with a more human inspired perception of time. Just because I feel it would be interesting and I a lazy, it might be a neat idea for the system to deal with computing S_t and T_1. So if a clock is told by a member of $\mathfrak{T}$ what time it is in terms of $\mathbb{T}$, then an anti-clock is told by a member of $\mathbb{T}$ what time is in terms of $\mathfrak{T}$. Why would this be useful in anyway you might ask.

7.6 Some sum clocks!

As the picture at the beginning part of clocked Naive Idea Theory might indicate the big idea of theory is the sum clock! The biggest change that we need to make is for sum clocks to take in an n-tuple of $\mathfrak{T}$ and for sum anti-clocks to take in an n-tuple of $\mathbb{T}$.



This model should give way easily to emergent times by the sum clocks from lower order prime-clocks. An example of this is when it is a time to eat breakfast:



7.6.1 Implementing notes

It might be a good idea for reading each clock to be a $O(1)$ operation so a new clock being added do not slow anything down except the sum anti-clock reading it. What this means is each clock is running concurrently dealing with its own bit of representation that needs a sense of time. For programming this using threads mutexs for a given clock it should use a mutex when changing its own time displayed, but not when determining what that time should be changed to.

7.7 Properties of the time

You may have noticed the diagrams for the sum clocks look like a network of sorts. You may have also noticed that we had a section prior about neural networks. This is no coincidence. In neural networks node are properties and their value are degrees of truth. In sum clock networks, we need to make a major change. We will not just use clocks to compute a time for something (which is akin to a property), but also how much it is a time for something (which is like a degree of truth). Thus members of $\mathbb{T}$ are pairs with properties[5] like in Basic Naive Idea Theory[6] and degrees of truth like in artificial neural networks![7]

$$\xrightarrow[\text{reads a time to}]{This\ prime-clock} (Make\ connections!, 0.998762356)$$

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[5] These are properties of the time.

[6] They are not to be tied down to topology, but are object of their own class!

[7] From now on degrees of truth will be referred to as intensities due to brevity.

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