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**Thought Boundary Detection in English Text
through the ‘Law of Conservation of thought’
for Word Sense Disambiguation**

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Abstract

Word sense disambiguation is a state of art solution attempts to determine the sense of a word from contextual features in a running text. Major barriers to building a high-performing word sense disambiguation system include the difficulty of labeling data for this task and of predicting fine-grained sense distinctions. In this paper, we address a different formulation of the word-sense disambiguation task and an analysis is being done about understanding of language. Rather than considering this task on its own. The present research based upon the analysis can be named as 'The law of conservation of thought'. Through this an atomic structure of thought, its conservation and transformation as well as the thought boundary detection process for disambiguation of the words in the text are analyzed.

Key Words: *Thought Direction, Mood, Goal, Communicant, Communicator, Thought of Communicant (CT), Receiver Thought (RT), Actor, Actress, and Reactor.*

1. Introduction

The problem of understanding the sense of a text and distinguishing between multiple possible senses of word is an important task in any higher order NLP system. However, despite its conceptual simplicity and its obvious formulation as a standard classification problem, achieving the high level accuracy in this field an illusive goal. With the standard process, the disambiguation task is being specified by an ontology defining the sense of ambiguous word. But this process at all cases not able to distinguish the sense as its sense some cases are very similar and hard to distinguish.

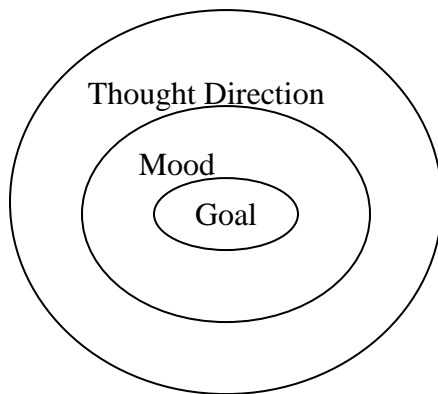
Here is a specification that the root cause is not at sense but at 'thought'. Every mode of expression including languages is started from 'thought'. How much the thinking process is robust, the mode of communication is become robust. The uniqueness of thought and its constant possession inspired the communicant to receiver about an effective transformation of thought by any means including language.

2. Thought and its atomic Components

Thought is nothing but the representation of knowledge. "All things would be visibly connected if one could discover at a single glance and in its totality the tracings of an Ariadne's thread leading thought into its own labyrinth" (See item 1 in reference).

Every thought it may express or not having four primary internal components. These are (I) Goal (II) Mood or stage of concuss (III) Thought Direction (positive or negative) In every point, even if before the expression of thought by communicant there is a goal being fixed as a goal has the character of an intention. At the time of communication a desire of expression can be considered as the initial goal for germination of thought which can be said as the power house of the thought which receives the central keys. A mood is being created to activate that goal. If the mood not becomes effective or tends to relative less by the effective of communicator or any other things then the thought is not goes in effective direction. Again every thought has two directions i.e. Positive or constructive and Negative or destructive. With the interference of environment factor an inborn negative components o thought again headed toward neutral or positive directions. In every point of expression these components are trying to be changed in above described factors of Communicator.

The Atomic structure of the thought can be described as follows:



Imaginary Thought Outline:

Again the three atomic Components of thought have been driven by two external Components name 'Purpose' and 'Action'. In the modification of the NOUN phrase or prepositional phrase or their related modifier case the 'purpose' part plays a vital role in the change of semantics of the sentences or its related words. In other ways the 'Action' part is more focused in the semantics modification of the Verb phrases or its related modifiers. So from the atomic components of the thought the 'goal' part comes in the boundary of the 'Purpose' but the 'mood' and the 'thought direction' comes under the boundary of 'Action' area.

3. The Laws of Thought and Its Conservation

The law of thought and its analysis has a long past. From the time of Aristotle to till date different views and experiments has come to solve the issue. The "laws of thought" are said to comprise the following principles.

3.1 The Principles of Identity

In philosophy, the law of identity is often mistakenly characterized by Aristotle who actually said:

"Now 'why a thing is itself' is a meaningless inquiry (for—to give meaning to the question 'why'—the fact or the existence of the thing must already be evident—e.g., that the moon is eclipsed—but the fact that a thing is itself is the single reason and the single cause to be given in answer to all such questions as why the man is man, or the musician musical, unless one were to answer, 'because each thing is inseparable from itself, and its being one just meant this.' This, however, is common to all things and is a short and easy way with the question.)" (See item 2 under reference.)

3.2 The Principles of Non-contradiction

Also by same Aristotle (384-322 BC), the law of non-contradiction is that "one cannot say of something that it is and that it is not in the same respect and at the same time". (See item 3 in reference.)

‘Avicenna’ also gives a similar argument: Anyone who denies the law of non-contradiction should be beaten and burned until he admits that to be beaten is not the same as not to be beaten, and to be burned is not the same as not to be burned. (See item 4 in reference.)

3.3 The principles of middle exclusion (See item 5 under reference.)

Aristotle wrote that ambiguity can arise from the use of ambiguous names, but cannot exist in the "facts" themselves:

It is impossible, then, that 'being a man' should mean precisely 'not being a man', if 'man' not only signifies something about one subject but also has a single significance. And it will not be possible to be and not to be the same thing, except in virtue of an ambiguity, just as if one whom we call 'man', and others were to call 'not-man'; but the point in question is not this, whether the same thing can at the same time be and not be a man in name, but whether it can be in fact. (Metaphysics 4.4, W.D. Ross (trans.), GBWW 8, 525–526).

However the fact that Aristotle’s language that distinguished between the use and mention of terms is yet to be analyzed. By him the logic and semantics are conjoined and spoken at once.

In all it can be concluded that, **“Thought is unique irrespective of its various expressions. It neither be created and nor destroyed. It can only change with the inference of context and only transfers from one state into another in the way of text flowing direction.”**

Ex: Have you ever tried to read the face of the moon? It shifts and changes, you cannot make it out. It shifts and changes, you cannot make it out. F [A] Human exploration of the Moon temporarily ceased with the conclusion of the Apollo program, although a few robotic landers and orbiters have been sent to the Moon since that time. The U.S. has committed to return to the Moon by 2018. F [B] The influence of the Moon is more subtle, for it relates to personality beneath the surface; your feelings and your subconscious self. It shows how you react to those around you based on the sum of your conditioned viewpoint and unguarded self-projection.

Often, the Moon's place in the chart shows a considerably different side of the nature. F [C] Moon generally soft and emotion in nature. Riding up the FDR Drive on winter nights with my grandfather in his car, I was amazed how the moon always followed us all the way home. Floating over the quiet landscape of glittering skyscrapers, gliding along the black ribbon of the river, "Hello, Mister Moon!" said my grandfather; "Hello, Mister Moon!" F

The divisions of the text in the flow of direction of the change of the thought about moon are in following way.

T = Thought Transformation Visible Point

The whole text flow will be $[0 > A > B > C]$

In the part of [0] the thought about 'moon' is totally reader or communicator dependent. So the total thought is being preserved at the communicant. With the flow of the text when the communicant reaches at the beginning point of the part [A] the communicant will understand that the communicant is trying to say something about the 'moon' which senesce to be a celestial object. It is a natural satellite and the thought transfers in the way of human exploitation to moon as soon as the receiver reaches at the end point of the text part 'A'.

As soon as the part [B] starts the thought is being shifted from a new direction or in the old direction the receiver is not conclude and still wait for the next part for the conclusion of thought. It can be said that the thought in the state of transfer. But with the end sentence of the part [B] the thought transfers from the celestial object 'natural satellite' to celestial / supernatural object 'the moon sign' the zodiac object of Vedic astrology. With this, the domain of thought is being changed from the Geo physics to 'Astrology'. In the part of [C] the moon is not only a celestial object but an object with life and emotion. It is now dropped in the sense of humanism that can communicate with man and understand the human language in an effective manner.

So, the sum of all the thought value in the system is a constant. The total measurement of thought at [0] will be like as the thought of $[A+B+C]$ or slightly less than that. But the point is who the divisor is. It may be said at every point the receiver can measure its thought and the point at where the total measured thought is equal or nearly equal with the thought of the communicant then the receiver will understand the total text like as communicant.

Description

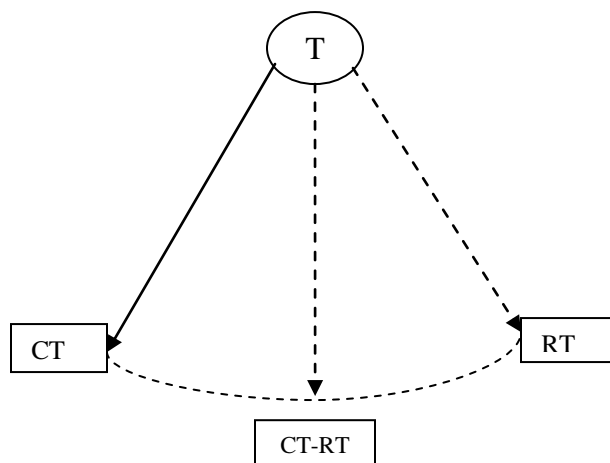
Conservation of law in the state of transformation: Diagram 3.1

Here:

T = Thought

CT= Thought of Communicant.

RT= Receiver Thought



We can now say and understand that:

$$CT + RT = 0$$

$$\text{Or } CT = -RT$$

The sum of CT and RT is the total thought.

This effect is in the absence of Communicator.

However the thought transfers itself at every point with the effect of communicator and it can be evaluated at every words of a sentence or text. But at all point, transformation is not being visible without evaluation. When a thought at the path of transformation change its three components form its predecessor existing components then a thought transformation is visible. In that point the text changes its direction of expression which is happen at the point of [A, B, C] in the above example.

4. The roll of Communicator in Thought Transformation

The roll of communicator is very high in the modification of communicant thought into Receiver thought. By which a single communicant thought reflects into different modified thought near receiver. So it is necessary to characterize the communicator and its behavior. Depending upon the communicator the communication process and activities are also varied. And a specific form of thought expressed in different ways. However here is the transformation of thought through the human language is greatly concern due to its high effective power of communication.

As the effective is communicator the thought transfer in that way. The receiver receives the thought in the form of knowledge from communicant through communicator.

The total diagram of the communicator and reflection of Knowledge as follows:

The whole Architecture of Communicator Diagram:

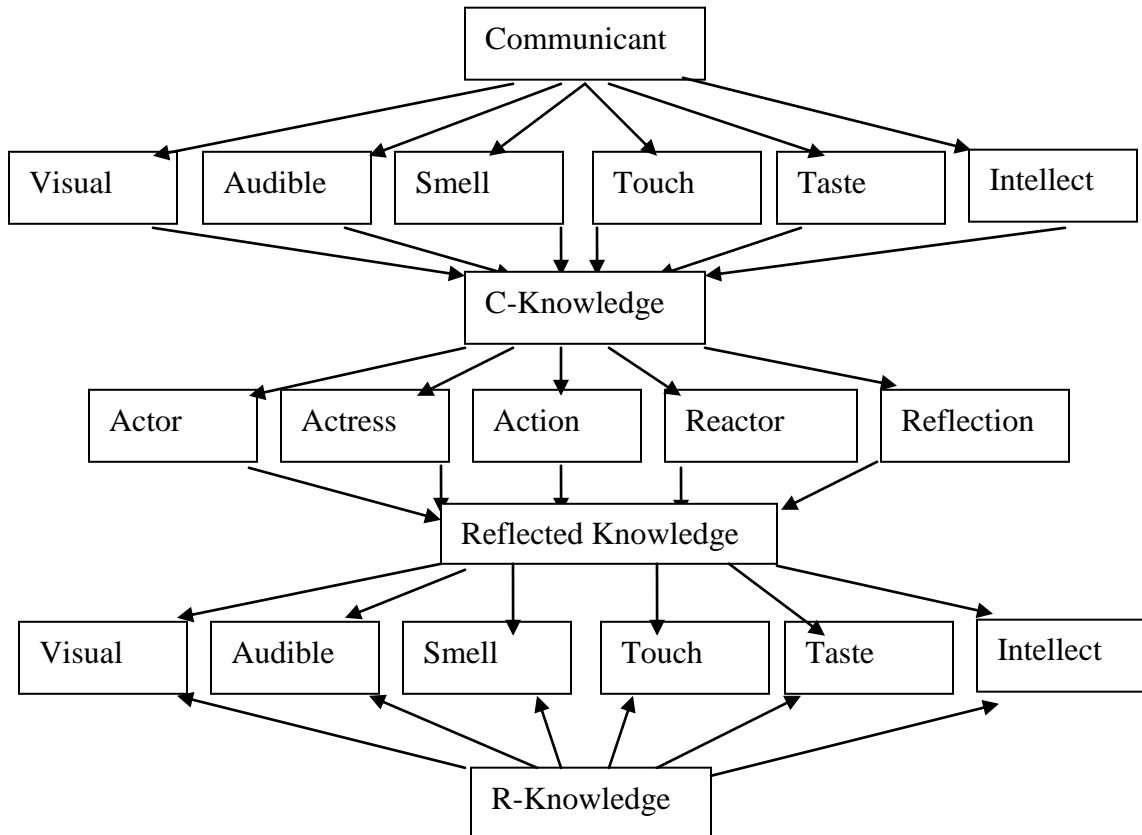


Diagram No 4.1

So, from the above if R-Knowledge (Receiver Knowledge) reflection is more than one then the expression of RT is more than one which can be cognized by many ways. Here $CT + RT \neq 0$. However if the RK tends to a single reflection then other sense of knowledge is being nullified for reorganization.

Ex: If the sentence 'It is evening.' Is being told by a shopkeeper to his boy then it reflects a multiple thought by the receiver in many ways.

In context:

Communicator = X or Shopkeeper

Receiver = Y or Boy, Actor = Shopkeeper

Actress = Boy, Action = ?

Reactor = Evening and the other possible steps by actress, Reflection = ?

In the above the shopkeeper by visual cognition recognizes that it is going to be evening. After his expression of the above sentence, the actress (itself receiver) also recognizes the state of evening by his own cognition. The other components audible touch and taste knowledge cognition in the above sentence are being absent. However the component 'knowledge' in this sentence holds a great key for reaction as it holds the prior information or activities recognized before.

Now, the action reflects by the actress by his expression of searching of candle, electrical switch or any other things. Here if the boy itself is a receiver then the knowledge inference by prior intellect is reflected at instance in that position. However the receiver is another person then he has to wait till the action is being performed by the actress that of lighting. So in that position the knowledge receiving by the Receiver through the whole process of communicator is being reflected to Receiver.

So, the receiver is always communicator dependent. Till the interference of the process of the whole communicator the knowledge simple for the receiver is just as initial or primary syntax meaning which is given by the communicator without processing the actress reaction. If the actress (the boy) provides the other action then the representation of knowledge for receiver is also being different.

5. Communicator and Its Role

Rather than the speaker or Communicant and the receiver, there is a vital role and responsibility of the Communicator in the change of the semantics and discourse of the sentences. But the thought communicator is not just like a single person or object. But a group of linguistic and philosophical units interlinked with one to another in order to smooth the transformation of the thought.

The Communicators first part is more linked with the speaker or communicants expressing or knowledge stored objects. Here we have taken six components of the communicant i.e. visual, audible, smell, touch, taste and intellect as the initial thought expressing object. The first five generally more stressed upon the at-present situation and the last one 'intellect' stressed more upon deposited past knowledge. The same case also happened in the case of receiver to receive the thought.

So, in another way to receive the thought by a receiver from the communicant, it is very much essential that these five parts should be one to one matching. If one or more part is not sent percent matched then the other remaining parts are trying to compensate those parts role extraordinarily. These five parts trying to express the thought in consolidated mode to the receiver's knowledge receiving components through the communicators processing components.

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Here is a great responsibility of the processing components how those manipulate or modified the thought to handover the receiver. The processing components generally comprise up “actor, actress, action, reactor and reflection”.

The actor may be the communicant itself or the third object about whom the thought is going to be expressed which we called in another sense as the subject of the sentence.

The actress part is the components of the thought to which the actor is trying express. So the actress part generally specified about the object of the sentences and its modified components.

The action part stressed upon the verb related part of ongoing part of the expressed thought or what the actor trying to convince the actress to perform.

Except the actor, actress and action he reactor part is the primary part depending upon the environment. How much sound is reactor the in-process thought of the actor is trying to change in that shape? The reactor components are except the actor and actress but in noun or prepositional phrase as the verb part is solely dedicated to the action part. The reactor part is tried to put pressure upon the mood and directional components of the thought.

As soon as the pressure comes upon the directional components of the thought the thought change its direction if required and expressed some new activities if required to more clear the semantics of the thought. At last the action part looking the reflection activities change his semantic nature finally by pressurize upon the action components of the thought.

The processed semantically modified thought comes in front of receiver for knowledge reorganization in the form of reflected knowledge.

Now, like the thought expresser the receiver by his knowledge receiving components tries to receive the knowledge from reflected knowledge. Here if the knowledge receiving components like ‘intellect’ of the receiver not match with the intellect of the expresser then the knowledge receiving is not fully transferred or transferred in newly manner in high or low form of the semantics as the thought components like ‘mood’ and thinking direction will not match in that case. And this whole process is cyclic in opposite direction is also by changed only the role of the speaker and receiver.

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When the receiver receives the thought of the communicant he /she again try to replay about the receiving of thought which is another process like above process.

6. Thought Boundary Detection Process

By the reorganization of thought boundary the semantic identification would be possible. As “Semantics is equivalent to capturing and exploiting the compact structure of the world and thought, is all about semantics.” (See item 6 under reference.)

So, the disambiguation at a fixed point of text and semantic identification of a text is a process of relativity. It is an ongoing process. The disambiguation of a word at a particular ‘word or text’ expected to be changed at speaker until the communicant complete his/her expression. Here is a clear argument:

Ex: I was at the bank. The bank was very rush. Every people were trying to do their transaction at first.

Here the word ‘bank’ has different dictionary meaning and semantic meaning.

Suppose the meaning of ‘Business centre = X & side of a river = Y and other = Z.

Let's suppose at the position of first sentence the value of Bank = Y

The thought transfers in the direction of Y. In second sentence the value of ‘Bank’ still ‘Y’ as the flow of thought as previous. But in third sentence a sudden transformation of thought appears by the word ‘transaction’. And to put the thought value constant if there is no such sentence before first sentence or any previous receiver knowledge about then the previous two sentences thought value and sense of ‘bank’ takes the value of ‘X’ rather than Y.

The Thought at first sentence beginning: $CT = 1$ $RT = 0$ at end if $RT = r$ then $CT = 1-r$

The Thought at first sentence beginning: $CT = 1-r$ $RT = r$ at end if $RT = r1$ then $CT = 1-r1$

The Thought at first sentence beginning: $CT = 1-r1$ $RT = r1$ at end if $RT = r2$ then $CT = 1-r2$

So, there is a complete transformation point.

By this transformation process and the role of communicator implementing the ontological classification the WSD can be find out. Here is the illustration of the example.

Human exploration of the Moon temporarily ceased with the conclusion of the Apollo program, although a few robotic Landers and orbiters have been sent to the Moon since that time. The U.S. has committed to return to the Moon by 2018. The influence of the Moon is more subtle as it relates to personality beneath the surface

It shows how you react to those around you based on the sum of your conditioned viewpoint and unguarded self-projection

Here speaker = X, Receiver = Y

Now the Confluence Knowledge for receiver by argument.

Table: 1

Cl. No	Reflection	Environment	Reactor	Action	Actress	Actor (address)
C1	?	?	Conclusion of Apollo program	ceased	? moon	Human exploration> moon
C2	?	that time	? Apollo program	sent	moon	Landers & orbiters
C3	To-return	By 2018	? Apollo program	committed	moon	U. S
This is the thought break point as the 'goal' of thought is always from Reactor and with noun or prepositional phrase.						
C4	?	?	subtle	is		Influence>Moon
C5	?	surface	?	relates	Personality	it
C6	react	Around you	those	Shows	you	it
C7	Sum of...	?		based		?
But here from C4 the Reactor changed as 'subtle' and it is continued to c7 because the pronoun always tends to that class identifier.						

How the actor actress etc. are determined from the sentence. This can be determined through the close class part of speech like Preposition, determiner adverb etc. In a reference it can be said:

Subject of the sentence with address 'of' = Actor.

Object of the sentence with address 'of' = Actress.

Verb of the sentence with Adv modifier = Action.

Sentence Object activity or the reflection's relational activity = Reactor.

Sentence Verbal part except Action part and its direct relation to actress or object = Reflection.

Place or Time denote = Environment.

The 'Goal' of a thought first traced upon > reactor then Actress and at last to Actor.

So, at what clause 'Goal' breaks or differs from that clause we can say another thought break point start steal its deviation comes out.

In the same manner, the merge thought be considered by a relation of the reactor + Actress + Actor relationship. Ex: The merge thought of the first three clauses will be (Apollo Program + Moon + xyz)

As whole, the text which class provides the uniformity to the whole text that is the fact to be highlighted subject matter. And based upon this the thought boundary of the text will be extracted.

Conclusion

The semantics of a sentence or text are not being fully disambiguated by local group chunking but by the taking the whole text comes under a single transformational thought. The ontological hierarchy, WordNet, local word chunking are may required to help in this process but the thought transformation and word sense disambiguation is a continuous process in text thought flowing direction and the sense of the words or texts are changed by nature and meaning between the thought transformation point or in between the thought boundary.

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