

Incorporating human memory models into artificial intelligence techniques

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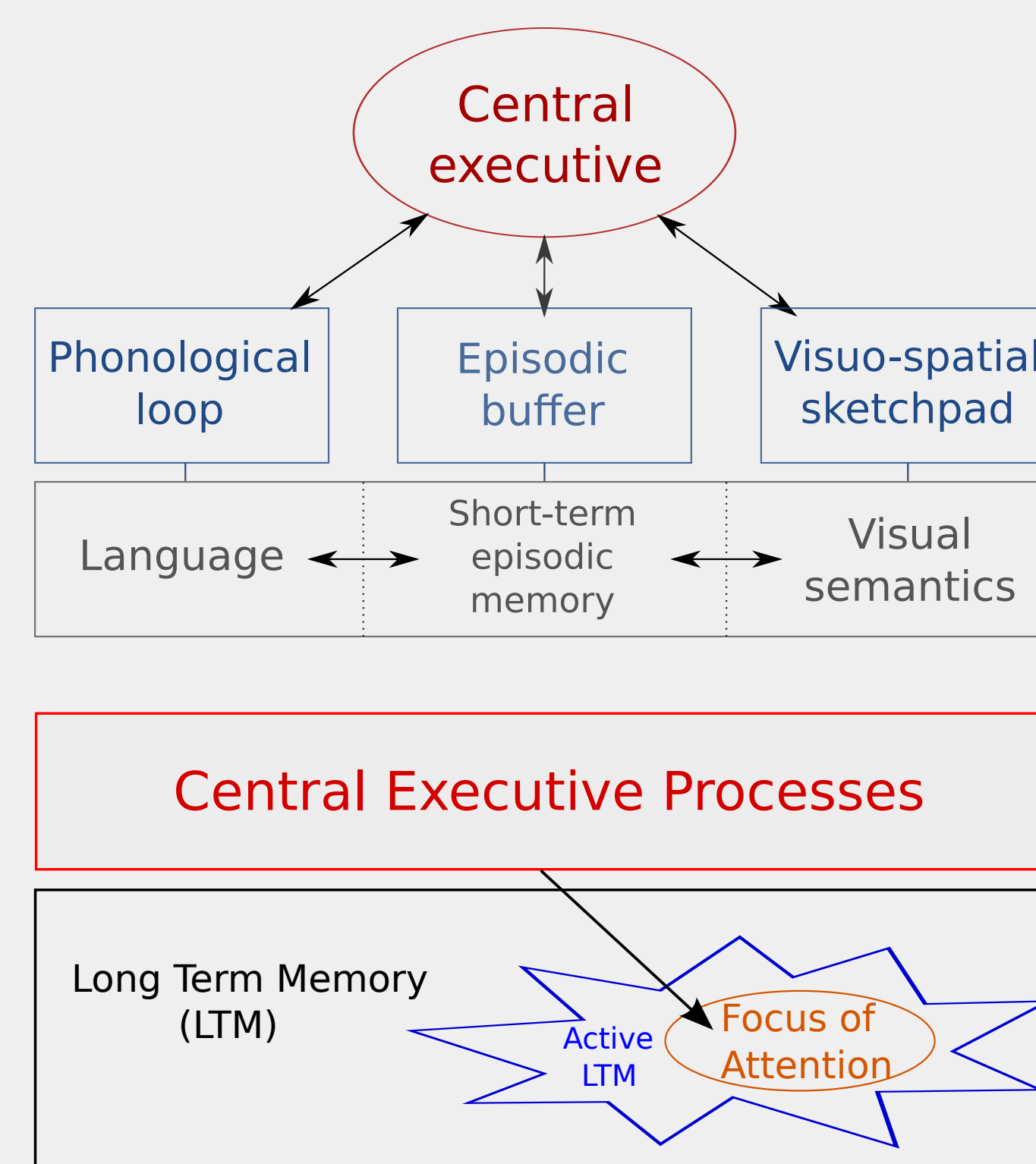
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Introduction

- ▶ The human brain and computers can both be used to compute and calculate. However there are differences between the way they function and how they “learn”.
- ▶ The human brain:
 - ▷ collects and stores almost unlimited memories
 - ▷ quickly groups related memories, events, and actions
 - ▷ uses past experiences to solve related problems
 - ▷ insight into problems guides solutions
 - ▷ has trouble with conscious repetitive calculations
- ▶ Computers:
 - ▷ have perfect memory
 - ▷ perform repetitive calculations exceptionally
 - ▷ collect information relatively slowly (information bottleneck)
 - ▷ are incapable of efficiently filtering information sets based on problem context

Motivation

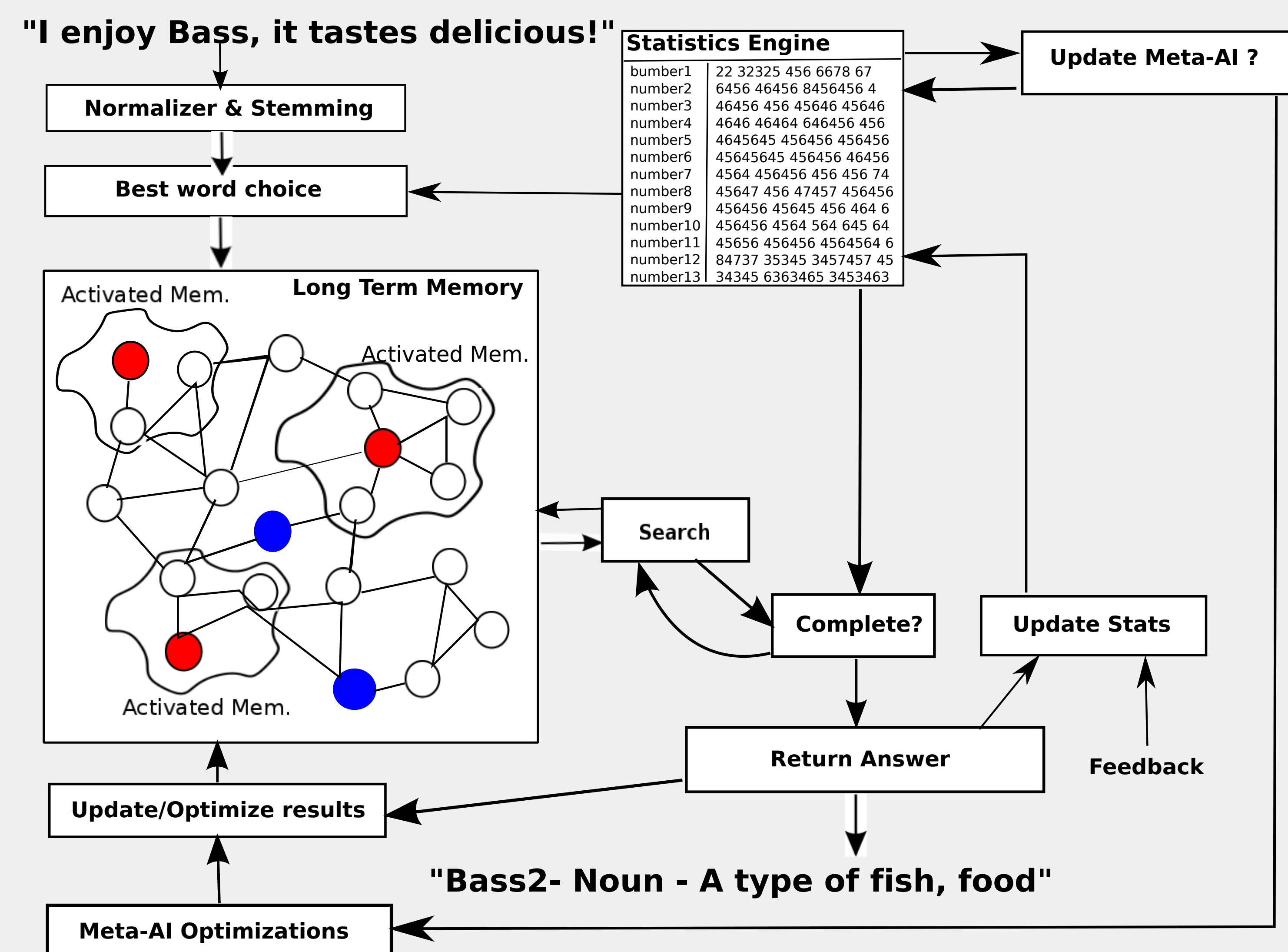
- ▶ Recent introduction of human memory models from various scientific disciplines allows for theoretically inspired design.
- ▶ Baddeley and Hitch(74,00):
 - ▷ three systems responsible for short term memory maintenance
 - ▷ executive responsible for coordination, integration, focus and suppression
- ▶ Cowan(95):
 - ▷ working memory is part of long term memory, not separate
 - ▷ organized in two levels: activated memory(unlimited) and focus of attention(5-9 items)
- ▶ Ericsson and Kintsch(95):
 - ▷ different types of memory for different purposes
 - ▷ working memory has retrieval structures that connect simple memories to more complex



Methodology

- ▶ A natural fit to this method is in the area of Natural Language Processing, specifically Word Sense Disambiguation (WSD).
- ▶ WSD is the act of identifying the meaning of a word in a sentence when the word has multiple possible meanings
- ▶ The memory models will be constructed and tuned to the WSD problem, using both machine learning techniques and methods identified in the models
- ▶ Testing will consist of using datasets from the Senseval/Semeval contests, comparing the human memory models' accuracy to the accuracy of past contestants.

Internals



Goals and Outcomes

- ▶ determine the effectiveness of theoretical memory model usage on artificial intelligence problems
- ▶ test highly regarded theories to provide insight to other scientific disciplines
- ▶ improve word sense disambiguation accuracy, bringing the goals of automated text translation, information retrieval, extraction and analysis closer to realization