

Cognitive Models for Social Media Analytics

Open
Systems
Lab

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Problem Setting



Extracting insight into people and their preferences from social media data

Ack:

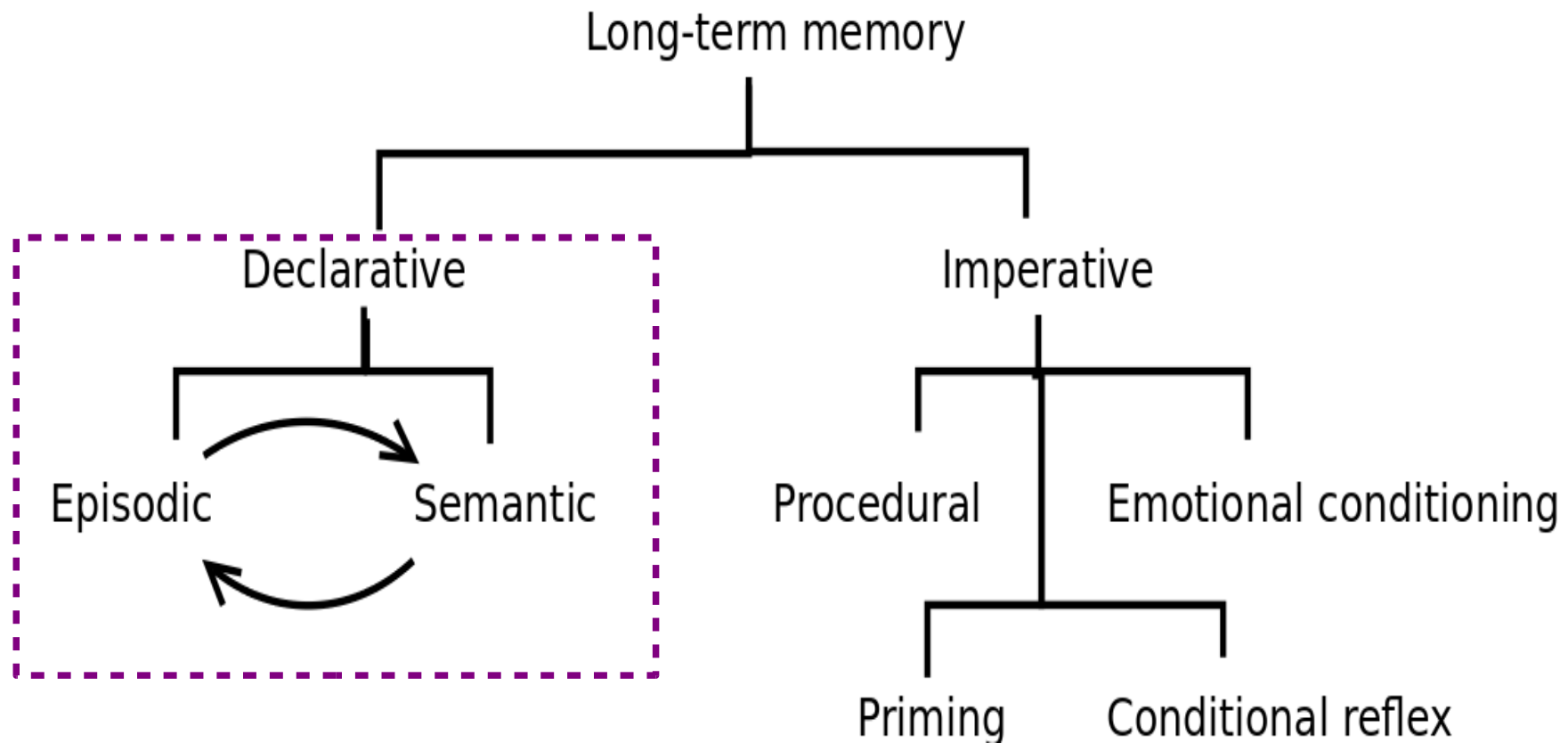
Icons from Findicons.com

Paradigms for Social Media Analytics

- Network Analysis
- Text Mining (document vector models, generative models)
- Language Models
- Cognitive Models



Cognitive Model of Semantics



Episodic and Analytic Semantics

- Episodic Semantics: Semantics distilled from situations of an autobiographical nature (episodes)
 - “This person was rude to me when I asked him for directions..”
- Analytic Semantics: “General knowledge” semantics distilled over several episodes
 - “People in this city seem to be insecure and don't like to speak to strangers..”

System Architecture



Analytic
Semantics

Episodic Hypotheses

Semantic Episodes

Repository

Episodic Hypothesis

A hypothesis that generalizes on observational patterns across episodes (typically patterns of co-occurrence) and asserts the presence of a specific analytic semantic association



Episodic Hypothesis Example

- Topic
 - Analytic Definition: Aboutness: Given a set of concepts, their “topic” represents what the concepts are collectively “about.”
 - Episodic Hypothesis: If an episode is about topic t , then it is likely to mention t as the length of the episode increases
 - It is difficult to have a long meaningful conversation about “cricket” without mentioning “cricket” itself.

Episodic Hypothesis Example

- Semantic Attribute
 - Analytic Definition: Characteristic Property: A semantic attribute of an object O is another object or concept that represents one of the defining characteristics of O
 - Example attributes of “Bangalore”: Lalbagh, Cubbon Park, Vidhana Soudha, IISc, Kempegowda, ...
 - Episodic hypothesis: Determinability: Given a term O , its semantic attributes are a set of terms $A(O)$ that collectively maximize the probability of generation of O in any episode containing them
 - Example: The “twenty questions” game..

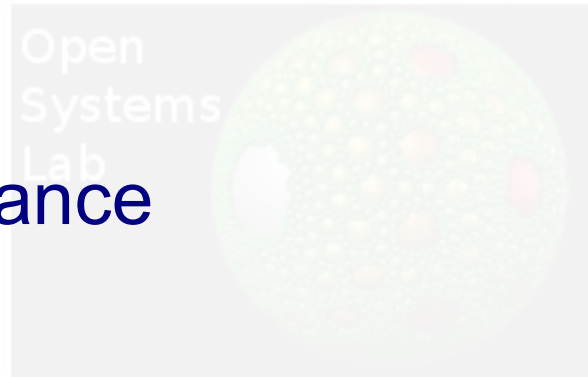
Episodic Hypothesis

- Episodic hypotheses reduced to optimization or fixed-point computations over co-occurrence data from the repository
- Completed or nearly completed work on semantic associations like:
 - Topic detection
 - Semantic Attribute detection
 - Semantic siblings
 - Topic expansion
 - Topical markers

In the future..

Interested in discovering episodic hypotheses for semantic associations like:

- Affinity
- Acquaintance
- Attention



A little more in the future..

Semantic Interventions

An intervention in a working system by a cognitive engine, that aims to fine-tune the system's dynamics by understanding the semantics behind its dynamics. Example interventions include:

- Recommendations
- Message routing
- Semantics based reorganization of user interfaces
- Push semantics to mobile users
- Semantics-based alert systems

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Thank You!