Hierarchical Temporal Memory - literature research & community ecosystem

Marek Otahal, Olga Stepankova

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Abstract

This is a working DRAFT, although comments, corrections and contributions are very welcome!

The idea is to cover all available *literature* about HTM[1] and offer an overview of the community *ecosystem*: focus-specific projects, support tools for HTM, alternative implementations, etc.

The text would be divided into logical topics, each providing a brief description and references to the literature in Bibliography.

Contents

[1] Hierarchical Temporal Memory

1 Introduction

TODO Outline and explanation of this document.

1.1 HTM

Short into to HTM

1.2 Community ecosystem

types of resources: numenta, ML, videos, meetups, hackathons, projects, ...

2 HTM Theory

2.1 History

patent, ..

2.2 Principles

main HTM functionality, briefly compare, explain

2.2.1 Hierarchy

abstraction, layers

2.2.2 Sparse, distributed representation

Sparse, distributed, semantic vectors, ...

2.2.3 Spatial memory

SP, pooling

2.2.4 Temporal memory and Online learning

online learning on streaming data, TP, TM, sequences, time-series

2.2.5 Anomaly detection

anomaly, NAB, ..

2.3 Biological background

cortex, columnar structure, synapses, ... Not so deep, as this will be covered in a separate paper.

2.4 Mathematical formalization

missing, required

2.5 Evaluation & comparisons

NAB, benchmark

2.6 Discussion

problems and ideas of this section

3 Implementations

3.1 NuPIC

"Main" implementation

3.2 Language ports

Java, C++, ...?

3.3 Specialized functionality

Continuous, task-specific *nupic.vision*, *nupic.nlp*, ..., biological, ...

3.4 Discussion

Speed issues, simplified codebase, ...

4 Ecosystem

The community ecosystem, resources, projects and activities.

4.1 Resources

numenta.org, ML, github, gitter, videos, hackathons & meetups, ...

4.2 Sensory processing

vision, audio, NLP, ...

4.3 Applications

apps of nupic

4.4 Visualizations & IDEs

tools to help visualize and debug HTMs

4.5 Support

Connectors HTM2..., ??

4.6 Research

NAB, ML.benchmarks, vision, ...

5 Interested parties

3rd party subjects that are using HTM, or could be interested to do so

5.1 Using NuPIC

Grok, ...

5.2 Could be used with HTM

cortical.IO, ...

5.3 Interested

Areas where HTM has been,or could be applied.

6 Discussion

Overall comments and thoughts

7 Conclusion

brief summary

8 Acknowledgement

References