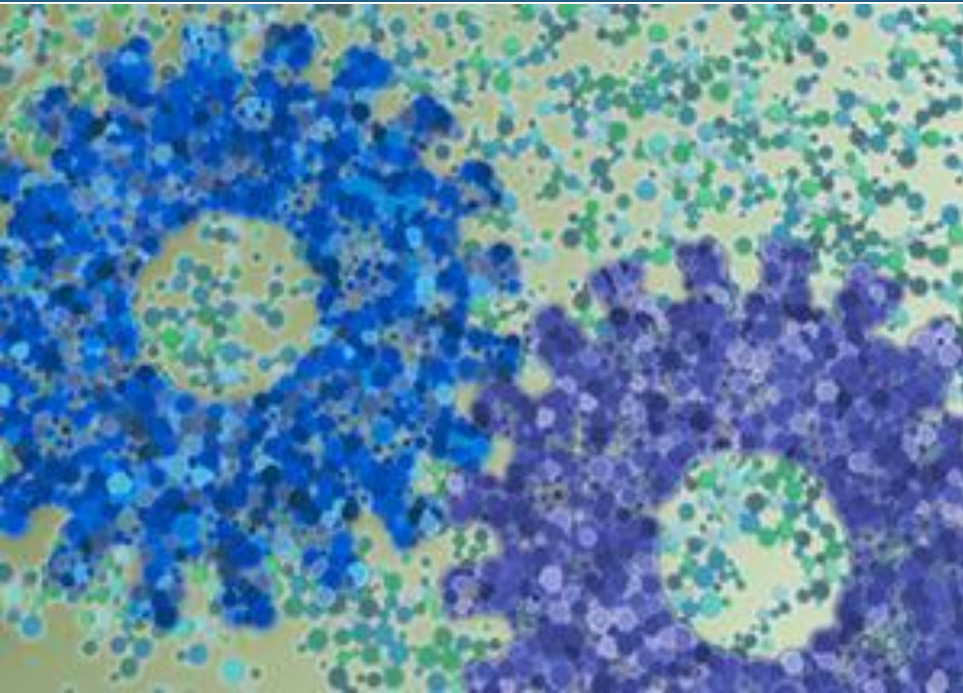


Semantic Framework and Deep Learning Toolkit Collaboration for the Enhancement of the Decision Making in Agent-Based Marketplaces



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Introduction

- This work introduces the collaboration of a semantic framework designed for collaborative agent-based manufacturing ecosystems and a web based Deep Learning Toolkit
- Key innovative aspects:
 - High volume of data which are also of high variety are managed by a Semantic Framework and become available to a Deep Learning Toolkit for further analysis
 - Deep Learning Toolkit analyzes the data and provides the output back to the Semantic Framework in order to enhance the efficiency of the rule-based matchmaking engine

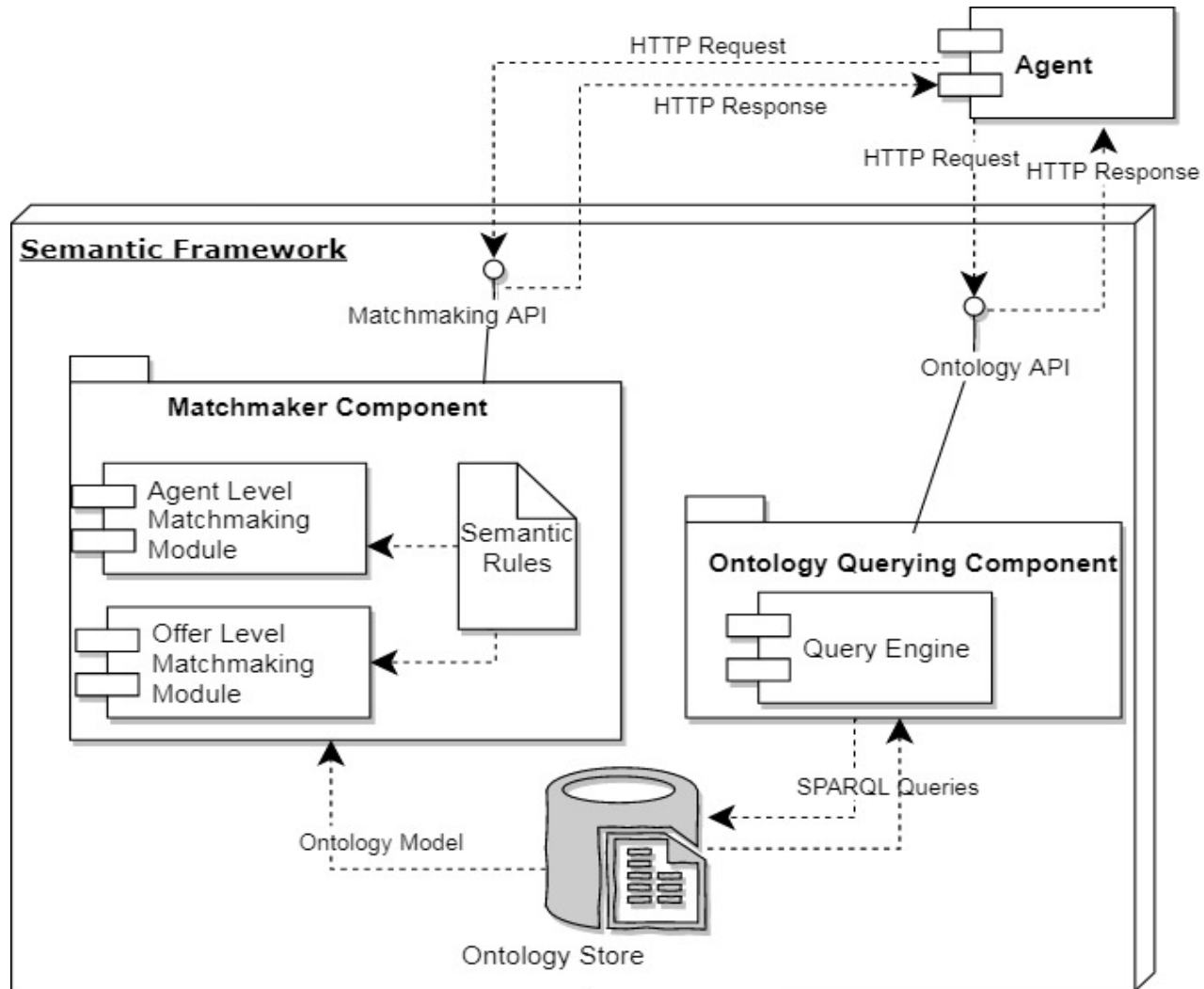


Why to create a Semantic Framework?

- *Ontology* was designed especially for collaborative manufacturing ecosystems and offers **interoperability**
- *Ontology Querying* component is designed in order to enable the **access** of ecosystem agents into the **common knowledge base**
- Semantic Matchmaker component enables **reasoning** and **infers new knowledge** from the Ontology Store



Semantic Framework



5th



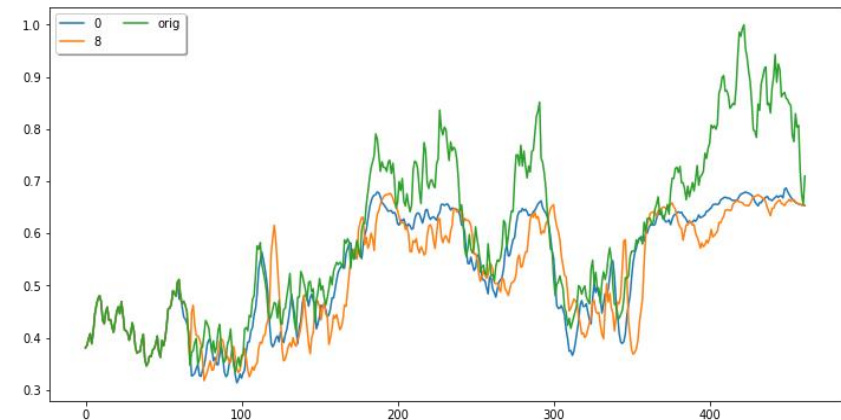
Why deep learning for factory of the future?

- Prolific environment
 - large amount of potential data available
 - tangible results achievable in finite time span
 - potential market exploitation
- Overcoming current state of the art
 - outperforming statistical models
 - continuous learning for adapting to dynamic production environment
- Correlated to upcoming existing technologies
 - improving of reasoning results, supporting decision systems



Deep Learning approach in COMPOSITION

- Deep learning toolkit
 - twofold application as both intra and inter-factory intelligent tool
 - intra-factory data analysis for predictive maintenance
 - inter-factory agent-based marketplace market estimation
- Continuous learning
 - triggered by inter-factory agents and learning framework



5th



Use Case Scenario

- Agent-based ecosystem in which every company is represented by an agent in the ecosystem
- Agents request from the semantic matchmaker a list of possible suppliers for waste management
- Suppliers sends their offers to the requester agent
- The Matchmaker evaluates these offers based on criteria such as price, delivery time and marketplace rating

Problem:

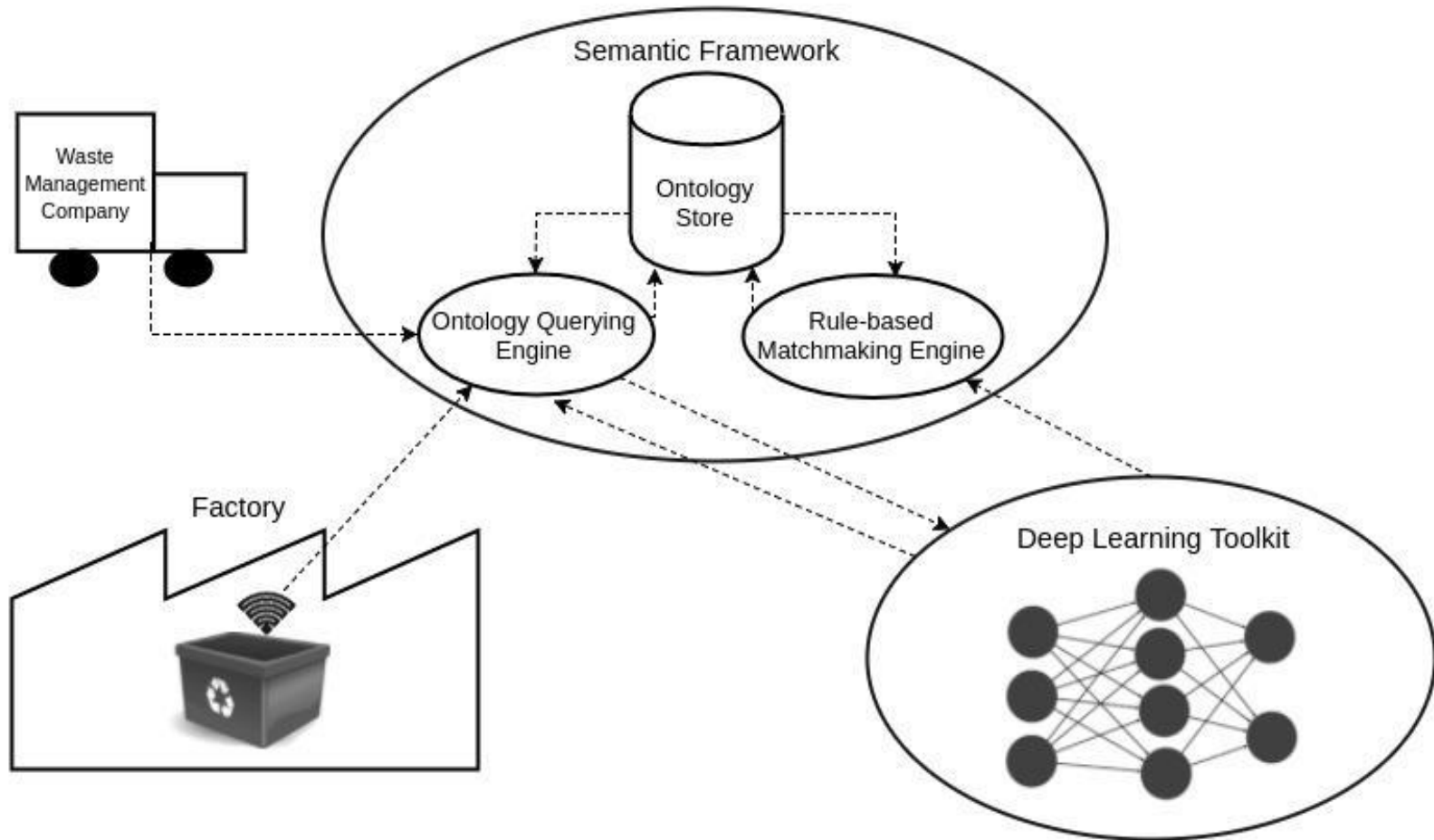
- The Matchmaker can suggest the supplier with the best offer (price) but it is unable to define if the provided prices are reasonable based on market trends

Solution:

- Use Deep Learning Toolkit for price estimation

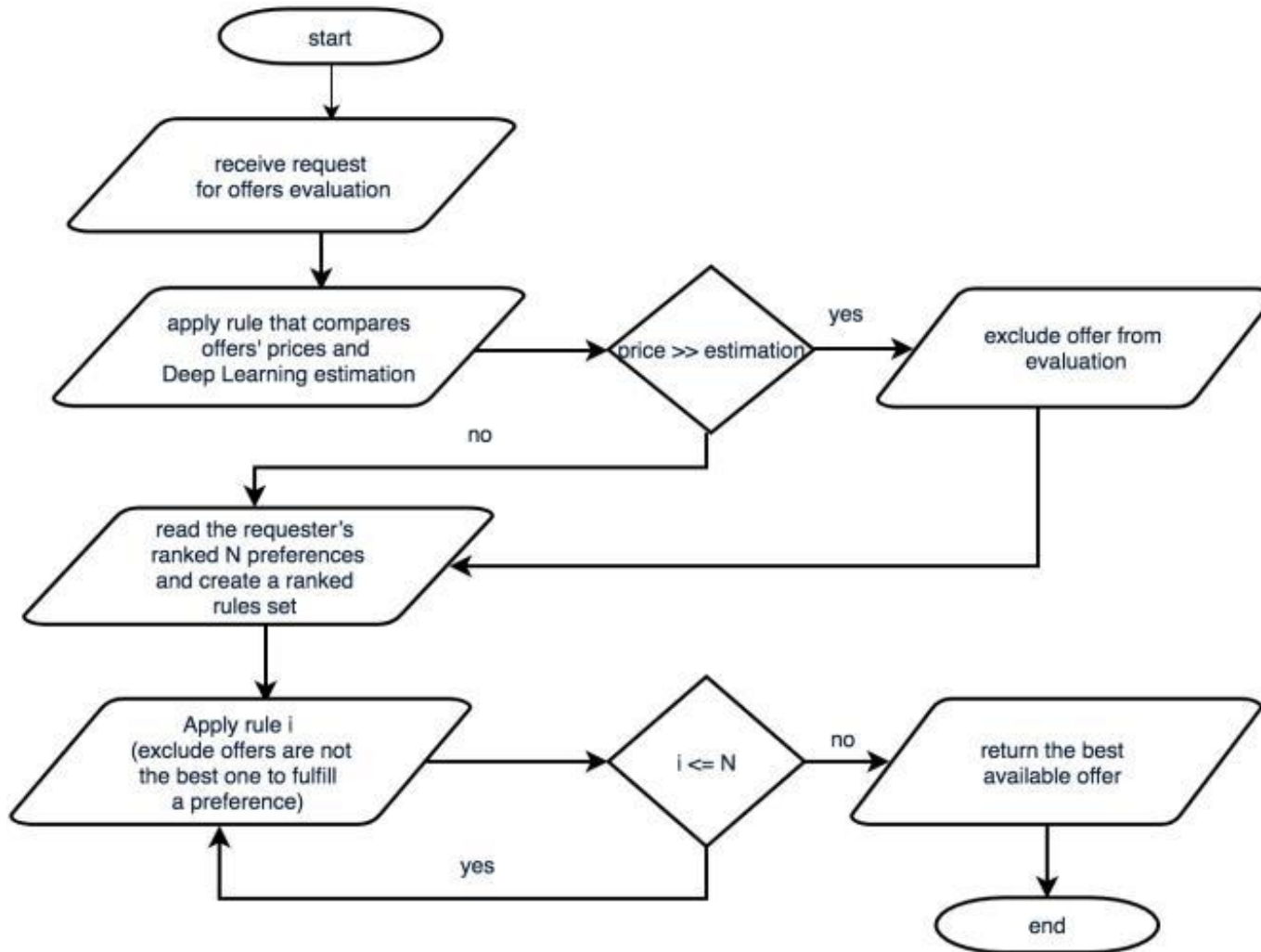


Use Case Scenario(2)





Use Case Scenario (3)



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Future work

- Enhance connection with matchmaking for extending the available information to be evaluated, consolidating the accuracy and improving reliability
- Extend current ontologies for supporting a broader range of possibly market correlated information, coming from heterogeneous sources (e.g., factors that influence stock)
- Experiment novel ANNs topologies and more datasets to be evaluated alongside contextual markets information
- Correlate these tools with other project tools (e.g., Reputation Model)



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