Automated Mapping for Semantic-based Conversion of Transportation Data Formats

Marjan Hosseini, Safia Kalwar, Matteo Rossi, and Mersedeh Sadeghi

Sem4Tra Karlsruhe

9th September 2019

Presented by: Safia Kalwar

sprint

(Semantics for PerfoRmant and scalable Interoperability of multimodal Transport)

Shift2Rail
Grant Agreement
No: 826172

Outline

- Problem Statement
- Objective
- Proposed Solution/Methodology
- Future Work

Grant Agreement No:
826172

Problem Statement

Objective:"Mobility as Service”

User can build door to door trips through single entry point.

Problem:

- Divergence of transportation standards
- Heterogeneity of data representations, formats and models.

Grant Agreement No:
826172

Research Objective

- Facilitate interoperability in transport domain

Targets and Goals

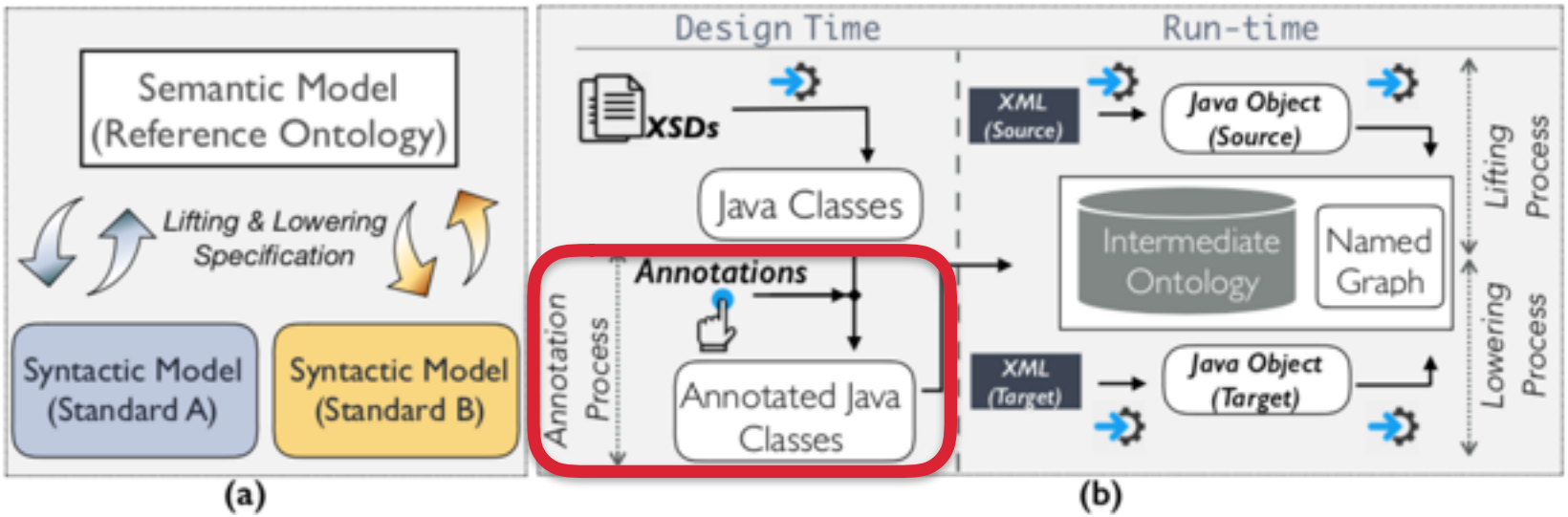
- Establish semantic interoperability rather than only syntactic
- Use semantic mapping to create communication between different systems
- Reduce the need of adopting unified data model
- Automate conversion process

Grant Agreement No:
826172

Methodology

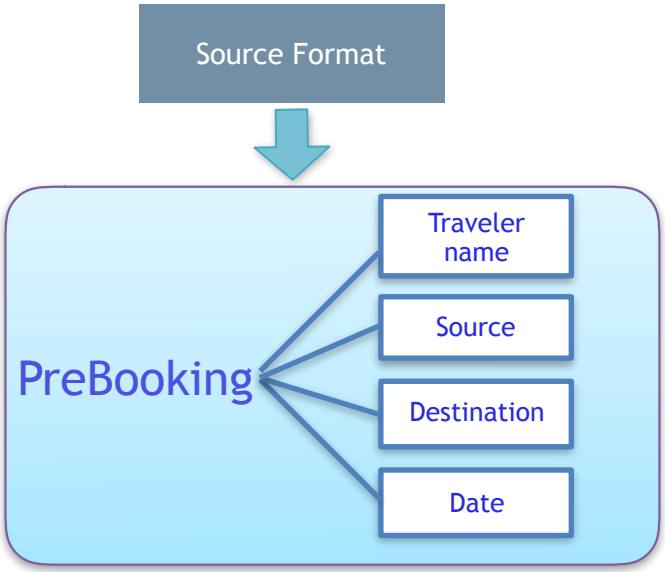
- Lifting:Transforming from source format to intermediate representation based on reference ontology.
- Lowering: Transforming from intermediate representation to target format

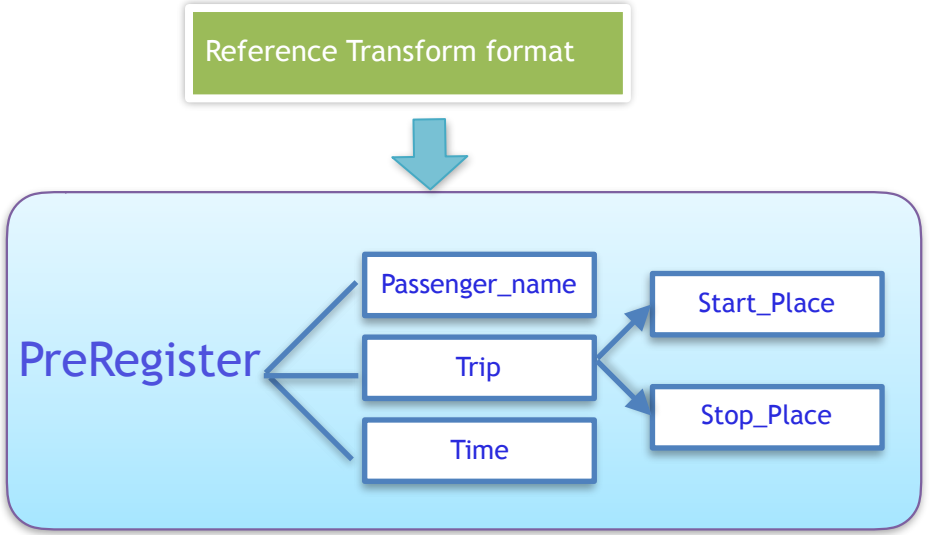
- **Objective:** Making annotation process automatic using machine-learning to increase performance and efficiency of system.



Grant Agreement No:
826172

Method

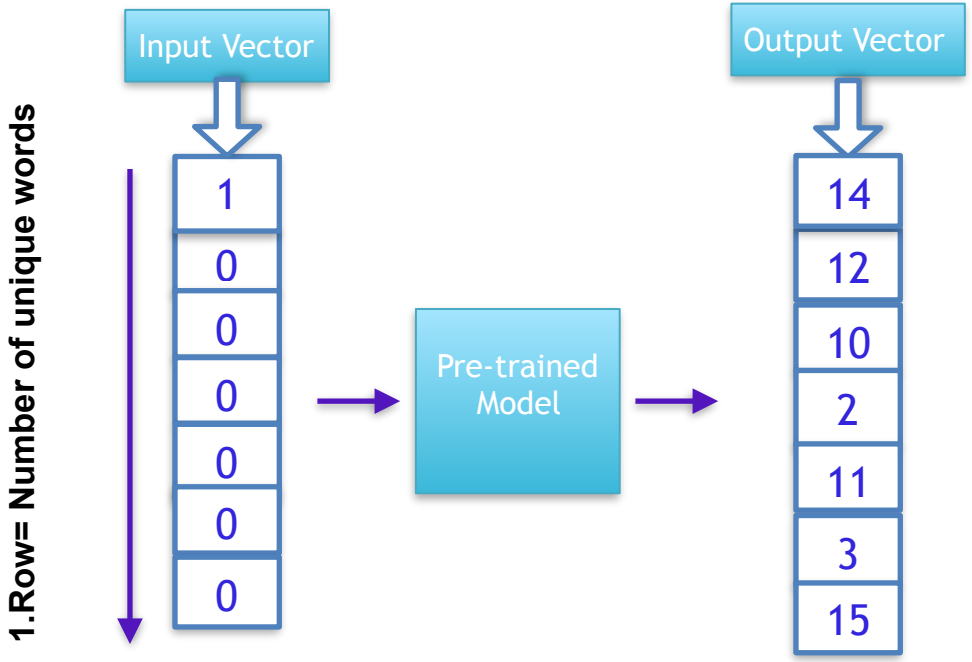


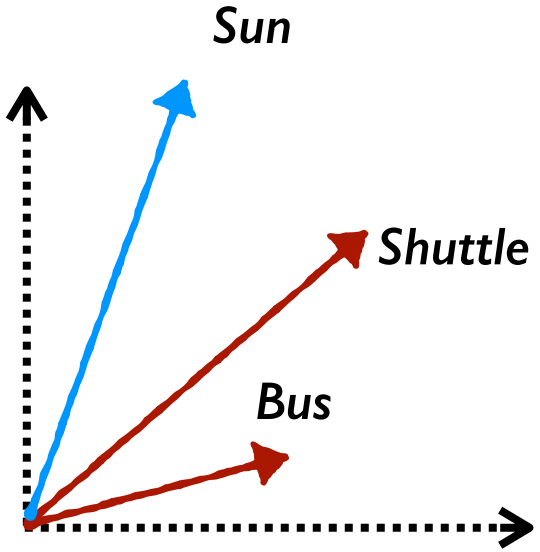


Grant Agreement No:
826172

Word2Vec

t: 1. 2. 3. 4. 5. 6. 7.
w: Bus operates between central station to North





Grant Agreement No: 826172

Work Flow

Source Format

Concept Identification

<Route>

Trained Word2Vec Model

<Google News>

Final Output

most similar words to 'Route' are :

1. routes
2. shortest_route
3. **Path**

Target Format

Path rank = 3/100

Grant Agreement No: 826172

Method Assumptions

Assumption 1: The language is both sides of the mapping is English

Assumption 2: For each concept in source system there is at least one concept in target system

Assumption 3: One to one relationship between source and target data formats

Assumption 4: All concepts exist in word2vec model

Grant Agreement No:
826172

Future work/Conclusion

- This model is based on Word2Vec Model.
- In a scenario for common terms this pre trained model is performing well.

Challenges

- Compound words might not exist in word2Vec model
  E.g: pre_booking. stop_place

- Due to absence of some terms in source/reference ontology mapping terms in target might face some difficulty.

Future work

- To validate the method possible approach is to prepare two datasets with different data formats containing equivalent instances.

Grant Agreement No:
826172

Thank you for your Time

Any Questions?

Grant Agreement No:
826172