DATA IN MOTION

Model Suggester First Implementation

04.08.2023

Model Suggester First Implementation

Part Contents

Section Contents

Where we stand

- From our previous studies about text classification, we decided to go with a model based on the cosine distance and the gloVe vectorization;
- Input text is vectorized according to gloVe 50D pre-trained model;
- The text category is determined by computing the minimal cosine distance from a set of trained words and determining whether it is below a certain threshold or not.

What we need

- A service which takes as input as EPackage and evaluates all the features' names and possible descriptions according to our model;
- A model to display the result of the analysis;
- A simple UI to display the results and trigger the whole process;
- A second service that is responsible for retraining our suggester when the user has made changes on the suggested results.

Section Contents

The Model Evaluator Service

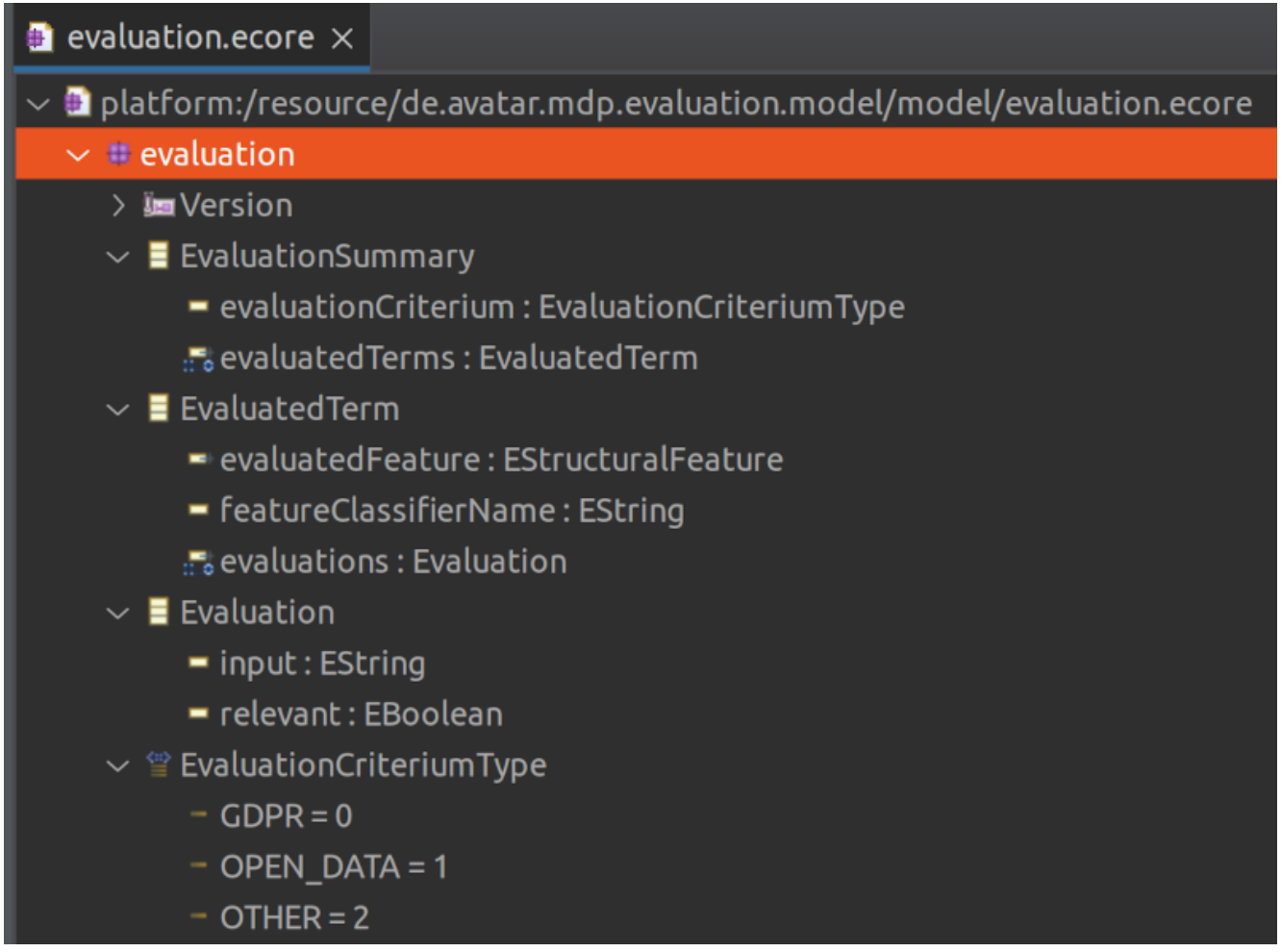
- I built an API `ModelEvaluatorService` which provides just one method:

```
EvaluationSummary evaluateModel(EPackage ePackage);
```

- The `EvaluationSummary`is an `EObject` of a new model I created;
- The first implementation of the `ModelEvaluatorService` evaluates the model based on GDPR privacy related terms;
- Additional implementations can then be added for other sets of regulations (OpenData, etc.).

Section Contents

The Evaluation Model

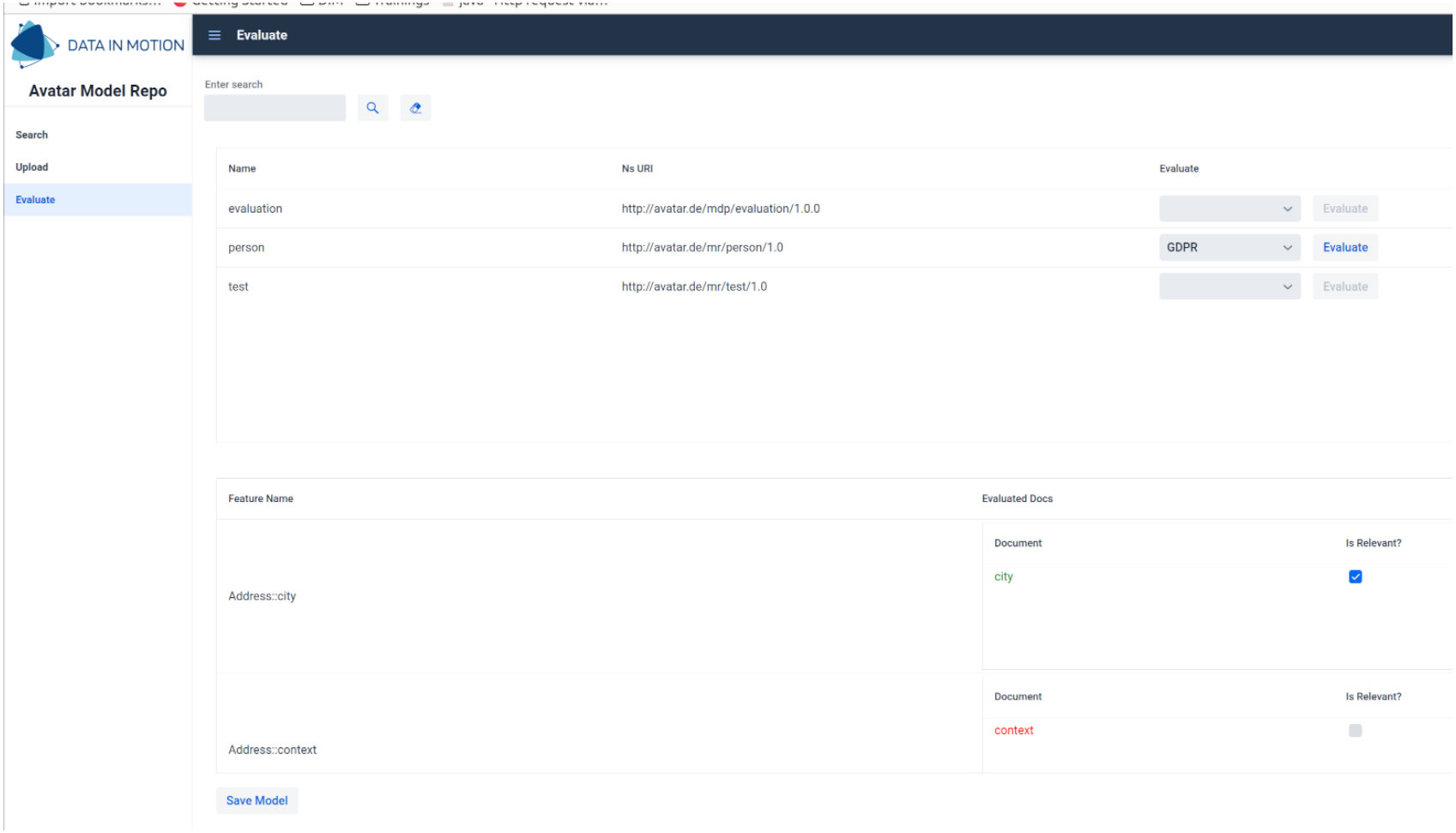


Section Contents

The UI

- I built a simple Vaadin view, in which you can search for a model in the system (which are registered through the `DynamicPackageLoader`) and trigger an evaluation;
- The `EvaluationSummary` is then displayed in a table, in which terms that are found relevant are marked in green, while terms that are found non relevant are shown in red;
- The user has then the possibility to change the result for each term.

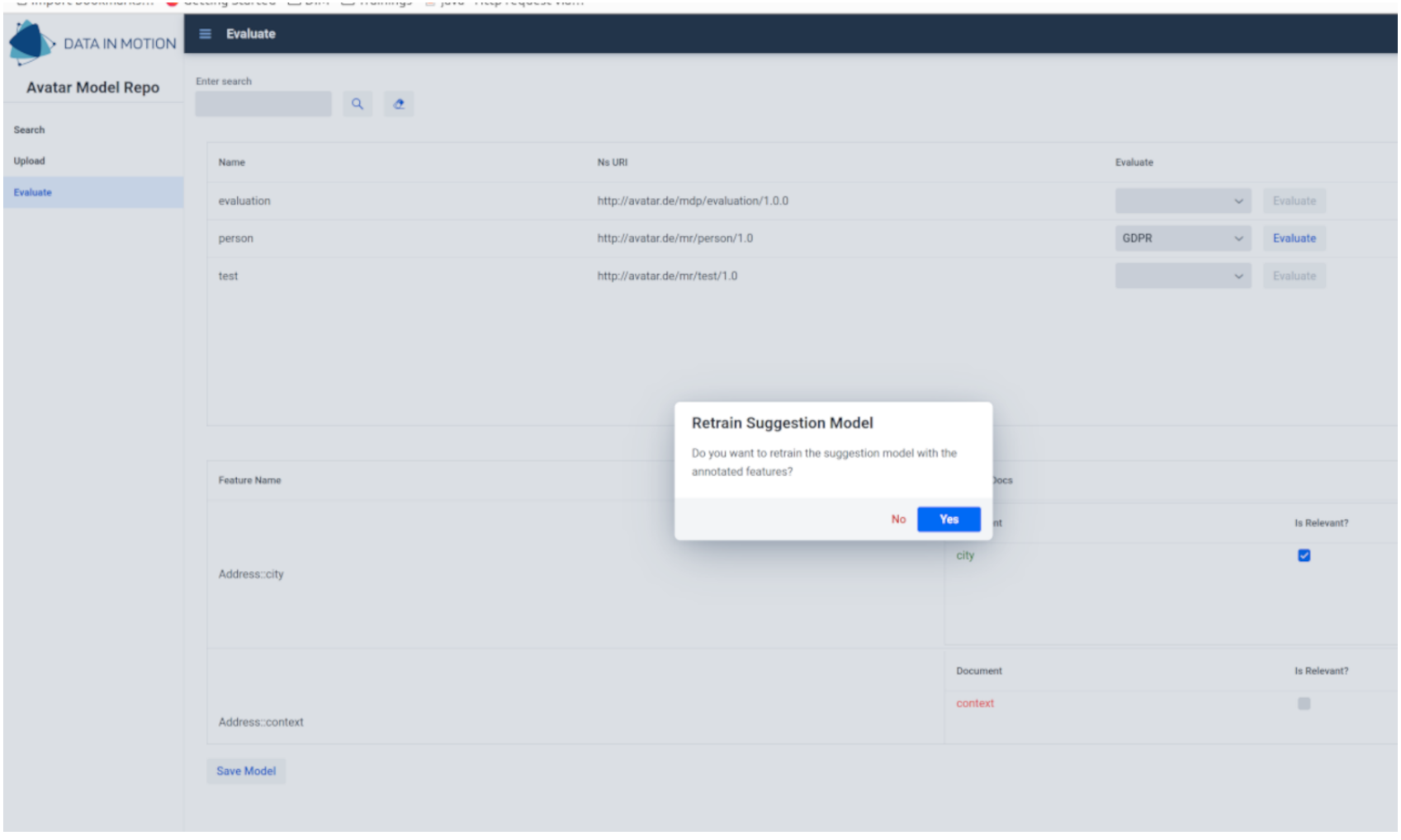
The UI



The UI

- When the user saves the changes, the creation of the coupled model with the information on the evaluation should be triggered;
- This part **has not been implemented yet**;
- When the user saves the changes, he/she can also trigger a retraining of the suggestion model, based on such changes;
- This will pass the list of evaluated documents to a dedicated service which will then add them to the suggestion model and recomputes the threshold for the determination of a document category.

The UI



Section Contents

The Suggester Retrainer Service

- A second API, `ModelSuggesterRetrainerService` has been cretaed;
- It contains a method to trigger the retraining of the suggerster:

```
void retrainModelSuggester(List<String> pertinentDocs, List<String>
    unrelevantDocs);
```

- I have implemented such API for the GDPR standards, triggering the retraining of the model;
- Additional implementations can then be added for other sets of regulations (OpenData, etc.).

The Retraining Mechanism

When the suggester model is retrained:

- The relevant documents are added to both the test and train set (if duplicated docs are present, the old ones are removed);
- The non-relevant documents are added to the test set;
- The documents of both train and sets are then cleaned, tokenized and vectorized again;
- The minimal cosine distance between each test document and the train set is computed;
- A new optimal threshold is determined based on the accuracy of the selection given a certain value of threshold;
- The new parameters and the new sets are saved in a file for further use.

Section Contents

Next Steps

- We could in principle also add the One-Class SVM model as possibility for the suggester, and see over time which one seems to perform better;
- This is something we have to monitor when someone actually starts using it;
- We have to think how we want to build the coupled model when a model has been evaluated.

Conclusion

Useful Links

OSGi Working Group

Working Group: www.osgi.org
WG Blog: www.osgi.org/blog
Twitter: @osgiwg
Bndtools: bndtools.org

Data In Motion

Web: www.datainmotion.com
Blog: datainmotion.com/blog
Twitter: @motion_data

Jürgen Albert

Email: j.albert@data-in-motion.biz

Mark Hoffmann

Email:
m.hoffmann@data-in-motion.biz