



ABSTRACT Matchmaker [1] proposes a solution for semantically matching Web Service requests with advertisements. This poster shows how this technique can be extended to identify relationships between closely related outputs and inputs and the degree of match between them. Using this method, we aim to ease the construction of workflows or pipelines of Web Services in biology and medicine.

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This GenBankService queries GenBank, a DNA database, with a unique identifier and outputs data of type `GenBank_record`

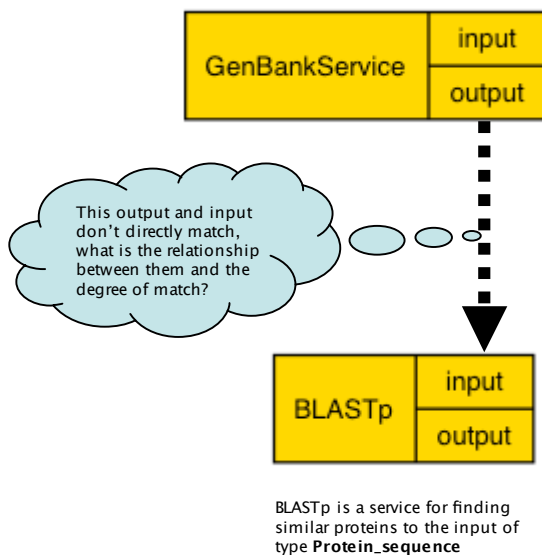


FIGURE 1. Given two services, it is often useful to know the relationship between them. If their inputs and outputs do not exactly match, they may be closely related, and the relationship traversed using some kind of "shim" service. In this case the relationship is *hasPart*

INTRODUCTION

In order to analyse genetic data on the web, biomedical scientists frequently need to match the outputs with inputs of Web Services to construct workflows or pipelines (Figure 1). However, because many available Biomedical Web Services process weakly typed data, matching outputs to inputs often requires the use of "shims" [2,3] to align services that have closely related inputs and outputs. This process is time consuming and requires lots of knowledge on the part of the scientist building the workflow.

Matching outputs and inputs based on UDDI and WSDL descriptions is limited, consequently Matchmaker [1] proposes a solution to semantically matching service requests with service advertisements using DAML-S (now OWL-S). Closely related services are ranked as having a semantic match of either *plugin* or *subsumes*. This poster shows how this technique can be adapted (Figure 2) to semantically match outputs with inputs based on new types of relations, in order to construct workflows.

```
degreeOfMatch (output,input) :
  if output=input return exact
  if output subclassOf input return plugin
  if output subsumes input return subsumes
  if output hasPart input return shim
  if output isIdentifierOf input return shim
  if output mapsTo input return shim
  otherwise fail
```

FIGURE 2. Modified algorithm from matchmaker with changes shown in red. This algorithm shows the rules for assigning the degree of match between a given output and input. The degree of matching called *shim*, uses new relationships *hasPart*, *isIdentifierOf* and *mapsTo*. These new relationships are based on the matchmaking scenarios outlined in [4].

CONCLUSIONS AND FUTURE WORK

Semantic matching of biomedical services has required the following

- An additional third degree of matching, let's call it *shim*, is required to describe two services are closely related, and can be aligned using a shim service. This match is in addition to *exact*, *plugin*, *subsumes* and *fail*.
- Adapting matchmaker (Figure 2) for the extra requirements of biology has required adding new relations *hasPart*, *isIdentifierOf* and *mapsTo* to an OWL ontology.
- The combination of the modified matchmaker algorithm and a service ontology with new relations could simplify the construction of biomedical workflows of Web Services.
- Future work: we are implementing this algorithm and evaluating it against data sets generated by manual annotation of a repository containing 1000 active Web Services used by biomedical scientists.

REFERENCES

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