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Biomedical Ontology Matching Using the AgreementMaker System

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Abstract. The AgreementMaker ontology matching system, which has been developed in the ADVIS Laboratory at the University of Illinois at Chicago, has been deployed to dozens of users in a variety of domains. In this demo we concentrate on research advances that make the AgreementMaker system particularly suitable for biomedical applications: (1) An extensible architecture; (2) Automatic combination of the results from matching methods; (3) Integrated matching and evaluation; and (4) Support for external vocabularies. AgreementMaker has recently obtained the best results ever in the OAEI Anatomy Track competition.

Ontology Matching System

AgreementMaker supports a wide variety of *matchers* and manual intervention to correct automatically found mappings or add new ones. An object-oriented architecture is used to define a generic matcher, which defers only a few operations to the concrete matcher extensions [2]. Matchers can be composed in series or parallel (see Figure 1(a)), with the system supporting the *automatic selection* of the weights assigned to the results of each matcher. This capability is integrated with an *evaluation component* that is supported by the user interface (see Figure 1(b)) [3].

Matching Anatomy Ontologies

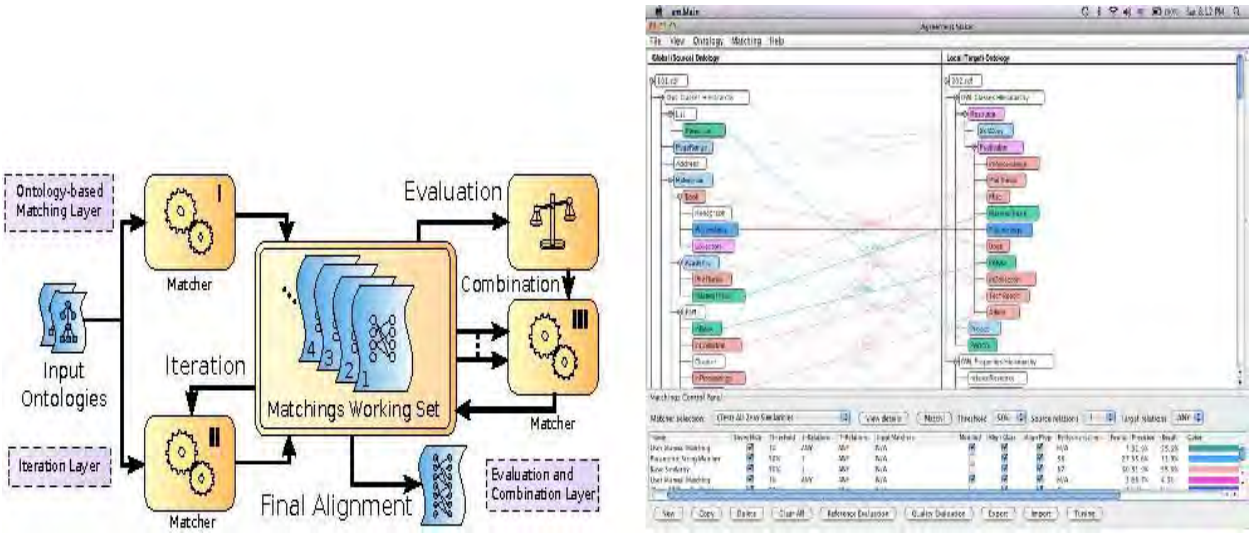
In 2009, AgreementMaker was ranked a close second in the OAEI Anatomy Track competition [4]. It used as an external vocabulary UMLS. In 2010 it was ranked first and the results that were obtained were the best ever [6]. The improvement over the previous year was partly due to the use of a principled approach for the integration of *vocabularies* [5]. In particular, each matcher was extended to incorporate lexicons. As external vocabulary, only WordNet was used this time.

Collaboration

Several capabilities of the system were driven by the real-world problems of end users who are sophisticated domain experts. To foster this kind of interaction, AgreementMaker is available for download (www.agreementmaker.org). For example, with the University of Lisbon, the *extensibility* of AgreementMaker was tested. They developed new matchers that could be readily incorporated into a new configuration for the Anatomy Track competition [7]. We also gained a better understanding of the nature of the ontologies used in the Anatomy Track (and in particular of their annotations), which led to incorporating lexicons into the matchers. With Miami University, two biomedical ontologies with greater heterogeneity than those of the Anatomy Track were considered. The idea of exploring the nature of the ontologies and of using lexicons was further explored by using annotation profiling [1].

Demo Description

Conference participants can load their own ontologies or use those already mentioned. They can also explore the system freely or follow a walk-through, consisting of browsing the ontologies, running different combinations of matchers, using the annotation profiling component, and evaluating the quality of the matchings.



(a) (b)

Figure 1. AgreementMaker: Matching process architecture and user interface.

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References

1. V. Cross, C. Stroe, X. Hu, P. Silwal, M. Panahiazar, I. F. Cruz, P. Parikh, and A. Sheth. Aligning the Parasite Experiment Ontology and the Ontology for Biomedical Investigations Using AgreementMaker. In *International Conference on Biomedical Ontology (ICBO)*, 2011.
2. I. F. Cruz, F. Palandri Antonelli, and C. Stroe. AgreementMaker: Efficient Matching for Large Real-World Schemas and Ontologies. *PVLDB*, 2(2):1586–1589, 2009.
3. I. F. Cruz, F. Palandri Antonelli, and C. Stroe. Efficient Selection of Mappings and Automatic Quality-driven Combination of Matching Methods. In *ISWC International Workshop on Ontology Matching (OM)*, volume 551 of *CEUR Workshop Proceedings*, 2009.
4. I. F. Cruz, F. Palandri Antonelli, C. Stroe, U. Keles, and A. Maduko. Using AgreementMaker to Align Ontologies for OAEI 2009: Overview, Results, and Outlook. In *ISWC International Workshop on Ontology Matching (OM)*, volume 551 of *CEUR Workshop Proceedings*, 2009.
5. I. F. Cruz, C. Stroe, M. Caci, F. Caimi, M. Palmonari, F. Palandri Antonelli, and U. C. Keles. Using AgreementMaker to Align Ontologies for OAEI 2010. In *ISWC International Workshop on Ontology Matching (OM)*, volume 689 of *CEUR Workshop Proceedings*, 2010.
6. J. Euzenat, A. Ferrara, C. Meilicke, J. Pane, F. Scharffe, P. Shvaiko, H. Stuckenschmidt, O. Sváb-Zamazal, V. Svátek, and C. T. dos Santos. Results of the Ontology Alignment Evaluation Initiative 2010. In *ISWC International Workshop on Ontology Matching (OM)*, volume 689 of *CEUR Workshop Proceedings*, 2010.
7. C. Pesquita, C. Stroe, I. F. Cruz, and F. Couto. BLOOMS on AgreementMaker: Results for OAEI 2010. In *ISWC International Workshop on Ontology Matching (OM)*, volume 689 of *CEUR Workshop Proceedings*, 2010.