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Josef Urban* (Josef.Urban@gmail.com), Intelligent Systems, ICIS / FNWI, Radboud
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Mizar.*

Formal mathematics allows unusually deep cooperation between computers and humans. Computers get access to the full semantics of formally expressed human ideas, and in turn, they can help humans with answering their formally expressed questions, using chains of precise deductive steps. In large formal libraries, precise deduction can be combined with inductive (e.g., learning and heuristic) methods, similar to the methods used for indexing and searching large non-semantic data collections (e.g., the Web). Such combinations can give rise to interesting AI systems.

In the recent years, Mizar and its large formal library have become a subject of such experiments in Automated Reasoning and Artificial Intelligence. The first results are Automated Reasoning and AI systems that process the whole Mizar library (more than 50000 theorems), and are capable of proving mathematical theorems expressed in the formal Mizar language within seconds.

In this talk, we will demonstrate the use of these systems. We will show how strong automated theorem provers (ATPs) can be used to prove Mizar lemmas, how machine learning systems can be used to advise with selection of knowledge from the large Mizar library, and (time permitting) we will explain how these systems work. (Received September 15, 2010)