

the basic functions of the CAS. Originally published in 1988 and updated in Mathematica 5, “The Mathematica Book by Stephen Wolfram”, Fifth Edition, 2003, is 1,488 pages long. A list of books by S. Wolfram’s books can be viewed at at [25].

Help system in Mathematica. The Documentation Center, Function Navigator, and Virtual Book are part of the Help system. These modules provide all necessary information to guide users through the language and functionality of Mathematica. Built-in documentation contains more than 150,000 representative and illustrative examples of Wolfram code. All documents are fully interactive; they are Mathematica notebooks in which the user can try out their own code and modify the examples directly in the Help system.

The theses outlined above are important from the position of developers of computer systems for artificial intelligence to understand the current state in closely related fields, in particular because computer algebra systems, which implement intelligent computations with the help of a computer, are also one of the (and quite successfully developed) areas to adopt artificial intelligence.

V. EXAMPLES OF INTEGRATING WM TOOLS INTO OSTIS APPLICATIONS

A. Wolfram Mathematica. Current state

Building on over thirty years of research, development, and use around the world, Mathematica and Wolfram are geared for the long term and especially successful in computational mathematics. The roughly 6,000 functions (symbols) built into Wolfram allow the user to represent and manipulate a huge variety of computational objects – from special functions to graphics and geometric regions.

In addition, the Wolfram knowledge base [26] and its associated entity structure [27] allows to explain, interpret, and formalize hundreds of specific “things” (facts, situations, objects). For example: people, cities, food, structures, planets, etc. appear as objects that can be manipulated and counted.

B. Wolfram knowledge base. Coverage areas

The growing Wolfram Data Repository (WDR), based on Wolfram Alpha and the Wolfram Language, is now the world’s largest repository of computable knowledge. Covering thousands of fields, the WDR contains carefully selected expert knowledge obtained directly from primary sources. It includes not only trillions of data elements, but also a huge number of algorithms that encapsulate methods and models from virtually every domain. The Wolfram Knowledge Base is based on Wolfram’s three decades of accumulated computable knowledge. All data in the Wolfram KB can be used immediately for Wolfram computations. Every millisecond of every day.

the Wolfram Knowledge Base is updated with the latest data.

Major coverage areas of WDR [26] are shown in Fig. 1.



Figure 1. Coverage areas of WDR.

In [28] typical options for working with WDR in Education are outlined, as well as examples of interaction with Wikipedia.

With extensive statistics on hundreds of thousands of educational institutions around the world, Wolfram|Alpha can calculate answers to complex questions about education. For example, you can query what academic degrees students receive at prestigious universities, average enrollment figures by year for selected majors. In the examples [28] illustrations of the response to the query about the number of students in the Republic of Belarus, quantitative indicators for the leading universities of BSU and BSUIR are given. Ways to present knowledge and access to it are described. It is noted that access to the Wolfram knowledge base is deeply integrated in Wolfram Language (WL). Free-form linguistics makes it easy to identify many millions of entities and many thousands of properties, and automatically generates accurate Wolfram Language representations suitable for extensive further computation. WL also supports custom entity stores that allow you to perform the same computations as the built-in knowledge base and can be linked to external relational databases.

People interact with each other through speech and text, and this is called natural language. Computers understand people’s natural language using Natural Language Processing (NLP). NLP is the process of manipulating human speech and text with artificial intelligence so that computers can understand them. In [28] the basic NLP tools implemented in Wolfram Mathematica are noted. In particular: Speech recognition; Voice assistants and chatbots. Auto-substitution and auto-prediction. Email filtering. Sentiment analysis. Divertissements for the target audience. Translation. Social media analytics. Recruitment (staffing). Text summary (abstracting). Several representative examples with explanations of the functions of WL groups Structural Text Manipulation, Text Analysis, Natural Language Processing are mentioned.