The Past of Artificial Intelligence in Hungary

In memory of Edit Sántáné-Tóth

Artificial Intelligence research and its applications are now at the forefront of international R&D. Hungary's current vision in this field is set out in the Artificial Intelligence Coalition and within it in the document "Hungary's Artificial Intelligence Strategy 2020-2030". In this summary we summarise the history of Hungarian AI research in broad outline.

Our summary chart highlights some of the most important results of Hungarian artificial intelligence research, which on the one hand belonged to the main direction of computer science developments in Hungary, and on the other hand were of international importance. Our diagram groups the successes achieved around specific individuals or research areas. From the highlighted individuals or areas, you can follow the links the specific ones and find out about their outstanding achievements. Our references point to results and facts collected and stored in the NJSZT's Information Technology History Archive (iTA), which cover the events of Hungarian information technology history.

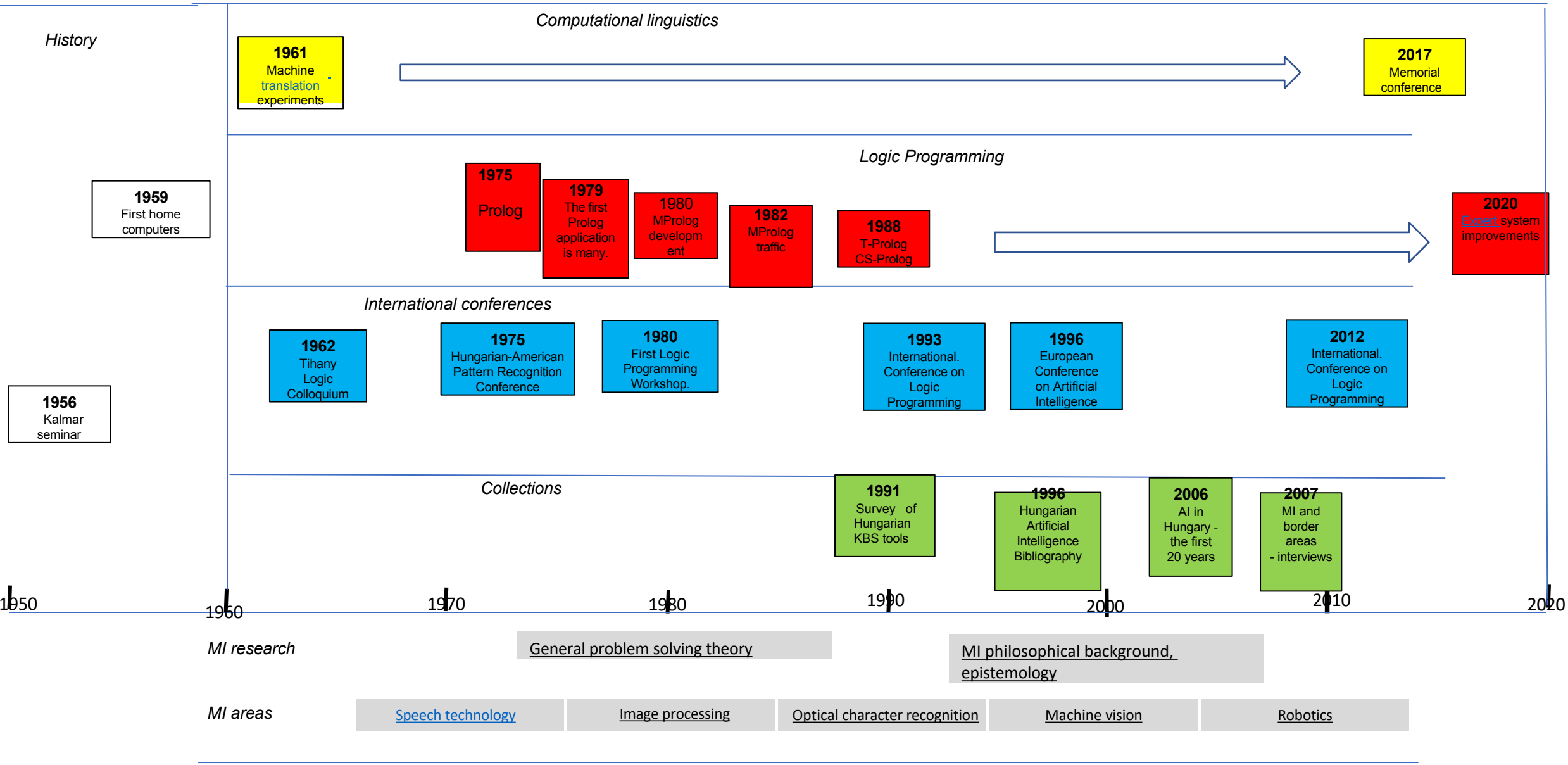
To get a more complete picture, we need to go back to the roots of Hungarian artificial intelligence research, which can be traced back to the Kalmár school of logic that developed in Szeged after the war. this environment, and through their students in the computing centres established in Budapest and Debrecen, the first experiments appeared, which could be considered as experiments in artificial intelligence (theorem proving, machine translation, music composition, health predictions, etc.). Significant progress was made when, as a result of the Hungarian interpretations of the PROLOG language, several advanced versions of it were implemented in Hungary, several expert systems were created with their help, and commercial versions of the language achieved international success. As a result, Hungary has become one of the centres of logic programming, as evidenced by the series of international conferences organised here.

More and more results have been achieved in the classical application areas of artificial intelligence: language analysis and machine translation; speech analysis and synthesis; image recognition and its applications; neural networks and their applications in vision; robotics, etc.
In addition to practical results, there have been significant analyses and studies on the philosophical background of artificial intelligence, the logic of learning, the cognitive background of learning, and applications of fuzzy logic.

The Neumann János Computer Science Society is the first social organisation bringing together Hungarian computer scientists, within the framework of which the Artificial Intelligence and Shape Recognition Section was established in 1976, and the Computer History Forum was founded in 2009, which collects the events and results of Hungarian computer history in a digital data repository and publishes them on the website itf.njszt.hu.

In February 2022, an exhibition presenting the work of Hungarian scientists and inventors was opened at Millenáris, entitled Dreamers of Dreams 20. This Its Infocommunication Node was created in cooperation with the Neumann Society, within the framework of which a Timeline based on our present compilation, but adapted to the needs of the exhibition and extended with the presentation of future trends, can be seen as a touch screen application.

Past of Artificial Intelligence Magyarorszfigon



First Hungarian computers 1959

The country's first electromechanical computer (Professor László Kozma's calculator /MESz-1) was completed by 1958. You can find out more about its history on the website of the project to "rebuild" the machine.

The M-3, the fully electronic computer of the MTA's Cybernetics Research Group, based on Soviet designs, started operating in 1959. In the lecture "Bringing a Computer to Life", Bálint Dömölki, one of the creators of the Hungarian M-3, talks about the Soviet predecessors of the machine, its construction and commissioning, and its first applications.

BACK

Machine translation experiments 1961

In the early days of computing, the most important application of artificial intelligence was seen as the automatic translation of natural languages. Already after the first computers appeared in Hungary, two language teachers at the BME, *György Hell* and *Győző Sipőczi*, started to experiment with translating from Russian into Hungarian, first on the MESZ-1 signal-catching machine built by Professor *László Kozma* at the BME, and then on the M-3 electronic computer of the MTA KKCs.

About the first experiments Hell George "*The Russian-Hungarian machine translation theoretical and practical issues*".

BACK

Memorial Conference 2017

After the initial experiments, significant research and development activities have developed in the field of computational linguistics, both theoretical (*Institute of Linguistics of the Hungarian Academy of Sciences*) and practical (*MorphoLogic Ltd.*). Major conferences have been organised, internationally listed on journal published ki (*Computational Linguistics*), sold widely used software products (e.g. spell checker), and played leading roles in EU projects on machine translation. In November 2017, the NJSZT iTF organised a commemorative conference on "*MorphoLogic and Hungarian Computational Linguistics*" to review the achievements.

BACK

PROLOG
1975

Logic programming emerged as a research direction in the 1960s: the application of mathematical logic to program development. In the 1970s, French and English researchers created a programming language based on mathematical logic, Prolog. The first interpreter for this was created in Marseille in 1972. In 1975, Peter Szeredi was the second in the world to develop a Prolog interpreter at the Computer Institute of the Ministry of Heavy Industry.

This has kick-started domestic Prolog developments and applications. "*The Early Days of Prolog in Hungary - a personal account*".

BACK

First Prolog applications 1979

The first domestic implementation of Prolog *was at the NIM IGÜSZI*, where researchers working on theoretical programming issues worked together with practitioners on practical problems. Prolog attracted their attention and a series of real-world applications were developed in areas such as architecture, medical research and information systems. These have also had a significant impact abroad, where Prolog has been used mainly in university/academic environments.

Detailed list *Edit Sántáné-Tóth* The situation of domestic PROLOG applications in 1979 in the compilation.

BACK

MProlog development 1980

The Prolog interpreter in CDL has been ported to most domestic machines, so a lot of experience has been gained in solving practical problems in Prolog. Therefore, it was decided to develop a new Prolog system at *the Computer* Science *Coordination Institute* (CSI), which is focused on supporting practical applications. It consists of an interactive development environment and modular components to ensure the efficient running of programs on different machines.

This became the *MProlog* (Modular Prolog) system, whose main data, detailed together with references to the literature, can be found in this guide.

BACK

MProlog distribution 1982

In the 80s first half of the market MProlog system significant interest from around the world, which was aided by the awareness of the Prolog language in Japanese
growth triggered by the Generation 5 programme. The CCI has met this demand by building an international network of distributors, as shown in the list of major foreign MProlog users and distributors. Interestingly, a separate company (*Logicware*) was set up in Canada for North American distribution and even managed to sell a few copies in the Soviet Union with the help of an academic research institute.

BACK

T-Prolog, CS-Prolog
1988

In 1979, *Iván Futó* developed additions to Prolog that allowed "parallel" execution and discrete simulation time handling. Building on this idea of *T-Prolog*, *the CS-Prolog* system, which provides discrete and continuous simulation capabilities, was developed as a stand-alone product in 1987-88, and its wide applications, international distribution and scientific links are described in this paper.

BACK

Expert system improvements 2020

Among the various applications built on Prolog systems, there are a significant number where some complex task is solved by the computer implementation of the human expert's decision-making ability. A significant number of such *expert systems* have been developed in various fields of society and economy, such as health informatics, pharmaceutical industry, construction industry, banking, etc. Among them, some of the most significant applications of expert systems in Hungary are presented in this selection.

BACK

Tihany Logic Colloquium
1962

The "*Colloquium on the Foundations of Mathematics, Mathematical Machines, and Their Applications*", organised by the János Bolyai Mathematical Society, was the first national meeting of the emerging Hungarian computational sciences, with the participation of some of the leading foreign (Eastern and Western) researchers on the broader topic.

The conference programme will also include sessions on *mathematical linguistics* and *machine learning* directly related to artificial intelligence.

BACK

First Logic Programming Workshop 1980

In recognition of Hungarian achievements in logic programming, the first world meeting of experts in the field was held in Hungary in 1980. The conference, held in Debrecen, had 60 foreign and about 60 Hungarian participants, and 42 papers were presented.

It was here that the International *Conference on Logic* Programming (ICLP) conference series was decided to be held, and has been held annually ever since, returning to Hungary in 1993 and 2012.

BACK

International Conference on Logic Programming 1993

By the 1990s, the ICLP had grown into a very large international event. In 1993 Budapest hosted the next international meeting, organised by the Neumann Society and chaired by Péter Szeredi. The sessions were already indicative of the diversification of topics, with an increasing focus on practical implementations.

The conference was published by the world-renowned MIT Press.

BACK

12th European Conference on AI 1996

The prestigious International Conference on Artificial Intelligence (ECAI) was organised for the first time in Hungary, a former socialist country. The achievements of the researchers of the Neumann Society's Artificial Intelligence Section, founded in 1976, were recognised in Western Europe, and the European AI research organisation found Hungary suitable to host an international conference of 600 participants, summarising the results of AI research to date. Two Hungarian researchers, Tamás Roska and Péter Szeredi, were members of the Conference Programme Committee.

BACK

International Conference on Logic Programming 2012

After nearly two decades, the International Association for Logic Programming (ALP), founded in 1986, brought the ICLP conference back to Budapest, once again chaired by Péter Szeredi. The premier event in logic programming addressed not only theory (e.g. semantic foundations, formalisms) and implementation (e.g. virtual machines), but also issues and applications such as natural language processing, semantic web, bioinformatics and, of course, artificial intelligence.

You can also read an insightful report on the conference, the highlights of which can be found here.

BACK

Survey of Hungarian KBS tools 1991

The study, which provides an overview of *knowledge-based systems* in Hungary, focuses on the Hungarian AI activities relevant to engineering applications up to the early 1990s, including applications of logic programming.

It includes many examples of expert systems used in chemistry, computing, construction, energy and other industries. It shows that AI has been useful in the economy for 30+ years - and that domestic researchers have strong international connections.

BACK

Hungarian MI Bibliography
1996

For the 1996 ECAI conference in Hungary, *Edit Sántáné-Tóth* compiled the Hungarian Artificial Intelligence Bibliography and a reprint collection of nine files, which was exhibited at the Neumann Society's booth. The compilation, containing references to works published in prestigious journals and other sources, and 400 papers by nearly 190 Hungarian authors, was a good representation of the extensive research going on in Hungary, with careful subject indexing to help orientation.

BACK

AI in Hungary - the first 20 years
2006

Edit Sántáné-Tóth, one of the first Hungarian programmers, became known as a developer of expert systems and later as a researcher of the history of AI. In 1996, she prepared an overview of the history of AI research in Hungary, which was updated in 2006 with a rich bibliography.

In this summary you will find organisations, journals, meetings, areas of research and development and funding related to AI. Thanks to intensive research between 1976 and 96 - from the semantic web to info-bionics and data mining - Hungarian AI entered a mature age.

BACK

AI and its frontiers - interviews 2007

In the early 2000s, specialist journalist *Ferenc Kömlődi* interviewed 30 Hungarian experts on artificial intelligence. In addition to a detailed description of the content, results, domestic and international relations of the topics they worked on, the interviewees were also given the opportunity to give their opinions on some general issues of R&D management. The texts of the interviews are available via the fact sheet.

The interview booklet was published by *Akadémiai Publishers* in 2007. The publisher has given its consent to the publication of the texts.

BACK

Kalmar seminar 1956

The roots of Hungarian computer science can be traced back to the Kalmár School of Logic, which was established in Szeged after the war.On 10 April 1956, Professor *László Kalmár* - a mathematician who was later awarded the international Computer Pioneer Prize - started a seminar at the University of Szeged aimed at learning about the technical applications of mathematical logic. This initiated the scientific activity, the results of which were published, among other things, *in the Szeged logic machine* and the development of the operating principles of the *formula-driven computer*, and can be considered the first steps in Hungarian computer science.

BACK

General problem solving theory

Starting from the mathematical theory of high-complexity systems, one line of research in artificial intelligence in Hungary is using mathematical logic tools to develop a *unified computational theory based on mathematics*, which can be used areas such as programming theory or intelligent data analysis. Important practical applications of all this are also being explored, notably in medical informatics.

The leading figure of the movement is *Tamás Gergely*, whose personal data sheet contains
details on each topic, with a generous list of publications.

BACK

MI philosophical background, epistemology

Tibor Vámos (1926-2021) was an internationally renowned researcher of the philosophical aspects of artificial intelligence, whose main area of research was the use of computing tools *in epistemology*, the science of cognition, which investigates the separation of reality and the image of it in our brains. He has published two books and many papers on this subject, including applications.

To mark his 90th birthday, iTF has compiled a compilation of Vámos' many influences on the development of Hungarian IT, one chapter of which is dedicated to "artificial intelligence researcher".

BACK

Hungarian-American Pattern Recognition Conference 1975

Since the 1970s, significant theoretical research work on *pattern* recognition has been carried out under the leadership of *Sándor Csibi* and *Tibor Vámos* at the Telecommunications Research Institute and the SZTAKI of the Hungarian Academy of Sciences. In addition to the Institute's seminars, this conference was an important milestone, with presentations by several world-renowned experts in the field.

BACK

Speech technology

As a continuation of the research initiated by *Sándor Csibi, Géza Gordos* led the Budapest University of Technology, where significant, practical results were achieved in both speech synthesis and speech recognition.

A summary overview of the results on speech processing was presented at the commemorative conference "*Computer Processing of Speech in Hungary*" organised by the NJSZT iTF in September 2018.

BACK

Image processing

Image processing is the digital processing of any image using computer algorithms. The Neumann Society's Section for Image Processing and Pattern Recognition (KÉPAF) was founded in 1997, but experts interested in scientific research, developments and new computer products related to computer processing and recognition of digitised images have met regularly at the Neumann Society since 1985.

You can find out about the activities of the department on its website. A list of the high quality KÉPAF conferences held every two years gives you the most important details.

BACK

Optical character recognition

Optical Character Recognition (OCR) is the digitisation of characters from an existing document (e.g. a printed document). To date, one of the most successful Hungarian software products worldwide is Recognita, developed in the second half of the 1980s at SZKI and marketed by Recognita Rt., a company founded in 1989. Its OCR technology was one of the most advanced in the world, able to recognise characters in most languages.

Detailed information can be found in the product description, while the history of the company was presented at a commemorative conference organised by iTF in 2019.

BACK

Machine vision

A leading figure in machine vision research in Hungary is *Tamás Roska* (1941- 2014), who, in collaboration with the University of California, Berkeley, developed a new type of computer, the *cellular neural network (CNN), which* enabled the development of a bionic eye prosthesis. International collaborations continue to use this to understand and model the visual system. In the medical aspects of vision, his son, *Botond Roska*, has made significant achievements at a research institute in Switzerland.

Roska Tamás' life story from interviewa detailed , and from video portraita we can get to know.

BACK

Robotics

Physically realised robots are designed to perform complex tasks similar to the physical and/or mental work of humans, either by program or by remote control.

Some popular examples (Szegedi Robotman) after first the industrial robots then drones, domestic robots, medical robots, educational robots, etc.

The "goal" of the RoboCup / RoboCupJunior world movement, which was established in our country by *Mrs Simon Béláné*, is for a humanoid robot team to defeat the FIFA champion team in 2050.

An overview *Képes Gábor* "The robotics in the workshops" is published in the "Élet és Tudomány" magazin.

BACK