Zdzisław Pawlak
Life and Work
1926-2006

Zdzisław Pawlak was an extraordinarily gifted human being whose life spanned 8 decades. He will be remembered as a great person with exceptional humility, wit, talent, insight and kindness as well as a very gifted researcher. His research contributions have had far-reaching implications inasmuch as his works have been fundamental in establishing new perspectives for scientific research in a wide spectrum of fields.

He was born on 10 November 1926 in Łódź, 130 km south-west from Warsaw, Poland[1]. In 1947, he began his studies in the Faculty of Electrical Engineering at Łódź University of Technology, and in 1949 continued his studies in the Telecommunication Faculty at Warsaw University of Technology. In 1950, he presented in Poland the first project of a computer called GAM 1. He completed his M.Sc. in Telecommunication Engineering in 1951. His publication in 1956 on a new method for random number generation was the first publication abroad in informatics by a researcher from Poland. In 1958, he completed his doctoral degree at the Institute of Fundamental Technological Research at the Polish Academy of Science with a Thesis on Applications of Graph Theory to Decoder Synthesis. Pawlak received his habilitation from the Institute of Mathematics at the Polish Academy of Sciences in 1963. In his habilitation thesis entitled Organization of Address-Less Machines, he proposed and investigated parenthesis-free languages, a generalization of polish notation introduced by Jan Łukasiewicz.

During succeeding years, Pawlak worked at the Institute of Mathematics at Warsaw University and, in 1965, introduced the foundations for modeling DNA and for molecular computing. In 1968 he proposed a new formal model of a computation known as the *Pawlak machine*. During the 1970s, Pawlak introduced knowledge representation systems. This led to his most widely recognized contribution, namely, his brilliant approach to classifying objects by their attributes (features) and his introduction of approximation spaces, which became the foundations of granular computing and provided frameworks for perception and knowledge discovery in many areas.

In 1973 he introduced knowledge representation systems as part of his work on the mathematical foundations of information retrieval. During the early 1980s, he was the head of a research group at the Institute of Computer Science at the Polish Academy of Sciences, where he introduced rough sets and the idea of classifying objects by the attributes[2]. Rough set theory has its roots in Zdzisław Pawlak's research on knowledge representation systems during the early 1970s. Rather than attempt exact classification of objects with attributes (features), Pawlak considered an approach to solving the object classification

---

[1] Wikipedia summary of the life and work of Z. Pawlak:
`http://pl.wikipedia.org/wiki/Zdzislaw_Pawlak`

[2] Pawlak, Z.: *Rough Sets*. Research Report PAS 431, Institute of Computer Science, Polish Academy of Sciences (1981); Pawlak, Z.: *Classification of Objects by Means of Attributes*. Research Report PAS 429, Institute of Computer Science, Polish Academy of Sciences, ISSN 138-0648, January (1981); Pawlak, Z.: *Rough sets*. International J. Comp. Inform. Science. 11 (1982) 341-356; see also: Orłowska, E., Pawlak, Z.: *Expressive Power of Knowledge Representation Systems*. Research Report PAS 432, Institute of Computer Science, Polish Academy of Sciences, April (1981); Konrad, E., Orłowska, E., Pawlak, Z.: *On Approximate Concept Learning*. Report 81-07, Fachbereich Informatik, TU Berlin, Berlin 1981; short version in: Collected Talks, European Conference on Artificial Intelligence 11/5, Orsay/Paris (1982), 17-19.

problem in a number of novel ways. First, in 1973, he introduced knowledge representation systems. Then, in 1981, he introduced approximate descriptions of objects and considered knowledge representation systems in the context of upper and lower classification of objects relative to their attribute values. During the succeeding years, Pawlak refined and amplified the foundations of rough sets and their applications and nurtured worldwide research in rough sets that has led to over 4000 publications[3]. The consequences of this approach to the classification of objects relative to their feature values have been quite remarkable and far-reaching. The work on knowledge representation systems and the notion of elementary sets have profound implications when one considers the problem of approximate reasoning and concept approximation. Also, during the 1980s, Pawlak invented a new approach to conflict analysis.

Professor Zdzisław Pawlak was with us only for a short time and, yet, when we look back at his life and accomplishments, we realize how greatly he has influenced us with his generous spirit and creative work in many areas such as approximate reasoning, intelligent systems research, computing models, mathematics (especially, rough set theory), molecular computing, pattern recognition, philosophy, art, and poetry. He had the ability to see the structure and texture of objects in nature both as an artist and as a poet as well as a pioneering researcher. It is possible to find a rich lore of insights concerning relations between objects in the paintings and poetry by Pawlak and the inner workings of approximation spaces that provide a basis for perceiving and observing classes of sample objects. As many can readily testify, Pawlak gave generously his time and energy to help others. His spirit, vision and insights have influenced many researchers worldwide. During his life, he manifested an extraordinary talent for inspiring his students and colleagues as well as many others outside his immediate circle.

<div align="center">

– Andrzej Ehrenfeucht, Ewa Orłowska, James F. Peters,
Grzegorz Rozenberg, and Andrzej Skowron

</div>

---

[3]See, *e.g.*, Rough Set Database System, `http://rsds.wsiz.rzeszow.pl/` and Pawlak, Z., Skowron, A.: *Rudiments of Rough Sets*, *Rough Sets: Some Extensions*, *Rough Sets and Boolean Reasoning.* Information Sciences 177(1) (2007) 3-27; 28-40; 41-73.