

On a contribution of membrane computing to a cultural synthesis of computer science, mathematics, and biological sciences

Adam Obtułowicz
Institute of Mathematics, Polish Academy of Sciences
Warsaw, Poland

*for 9th Brainstorming Week on Membrane
Computing, Seville 2011, in Honour of
Gheorghe Păun's 60th Birthday*

After a more than decade of the researches in the area of membrane computing initiated by Gheorghe Păun it is worth to initiate a discussion about a contribution of these researches to a cultural synthesis of computer science, mathematics, and biological sciences.

The theme of this discussion was inspired by

- [1] A. Jaffe and F. Quinn, *Theoretical Mathematics: Towards a cultural synthesis of mathematics and theoretical physics*, Bull. Amer. Math. Soc. 29 (1993), pp. 1–13,
- [2] M. Atiyah et al., *Responses to [1]*, Bull. Amer. Math. Soc. 30 (1994), pp. 178–207,

The theme of this discussion was inspired by

- [1] A. Jaffe and F. Quinn, *Theoretical Mathematics: Towards a cultural synthesis of mathematics and theoretical physics*, Bull. Amer. Math. Soc. 29 (1993), pp. 1–13,
- [2] M. Atiyah et al., *Responses to [1]*, Bull. Amer. Math. Soc. 30 (1994), pp. 178–207,

where René Thom's response concerned also a cultural synthesis of theoretical mathematics and biology.

We point out the following topics as a contribution to the discussed synthesis:

- ▶ biologically inspired self-assembly (randomized) P systems (with membrane division and creation) for solving NP problems,

We point out the following topics as a contribution to the discussed synthesis:

- ▶ biologically inspired self-assembly (randomized) P systems (with membrane division and creation) for solving NP problems,
- ▶ spiking neural P systems with learning problem solution, a step towards digitalization¹ of neural networks within mathematical neuroscience,

¹in a similar way as cellular automata digitalize physics according to Fredkin/Wolfram

We point out the following topics as a contribution to the discussed synthesis:

- ▶ biologically inspired self-assembly (randomized) P systems (with membrane division and creation) for solving NP problems,
- ▶ spiking neural P systems with learning problem solution, a step towards digitalization¹ of neural networks within mathematical neuroscience,
- ▶ fractal constructs generated by P systems and a possibility to experiment with them via P system computer implementation invented in Seville.

¹in a similar way as cellular automata digitalize physics according to Fredkin/Wolfram

Question

Do you see other topics as a contribution to the discussed synthesis?