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Cellular automata are discrete dynamical systems known for their properties of self-organization and capabilities of modeling complex systems. Being dynamical systems, it is important to understand how their behavior evolves along time. Stephen Wolfram, in the early 1980's, developed a classification of cellular automata by performing computer simulations that allowed to find that, starting from an initial random configuration, the probability that a cellular automaton falls in one of four classes is high. The characteristics of these four classes are the following: 1) tend to a spatially homogeneous state; 2) yield a sequence of simple stable or periodic structure; 3) exhibit chaotic a-periodic behavior; 4) yield complicated localized structures, some propagating. Wolfram's classification, as already outlined, is based on computer simulations, thus it lacks of formality. Robert Gilman in 1987 produced a more rigorous classification into three classes by using measure theoretic and probability concepts. The belonging of a cellular automaton into one of the three classes depends on the probability of choosing a configuration that will stay arbitrarily close to a given initial configuration under forward iteration of the rule describing the automaton.
However, Gilman's classification does not give any criterion to decide whether a cellular automaton belongs to one of these three classes.
In this context the research activity focused on finding a characterization of Gilman's classes through another powerful formalism, such as complex networks.
Complex networks, in fact, constitute an efficacious formalism to represent the relationships among objects composing many real world systems. Collaboration networks, the Internet, the world-wide-web, biological networks, communication and transport networks, social networks are just some examples. Networks are modeled as graphs, where nodes represent objects and edges represent interactions among these objects.

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Networks have long been studied and several measures have been introduced to provide a quantitative characterization of their structural properties.

The evolution of a cellular automaton has been modeled through a network where nodes correspond to the cells of the automaton, and an edge between two nodes u and v exists if a change in the state of cell u produces a change in the state of cell v, after the automaton evolved for a fixed time period. The graphs generated for some rules known to belong to Gilman's classes are being investigated and the aim is to find regularity in graph properties, such as degree distribution, centrality measures, shortest paths, that could allow to decide when a rule belongs to one of these classes. The availability of an algorithm to establish the membership to one of the classes could be very important to better understand the connection between Wolfram and Gilman's classes. Work in progress is trying to design a method to determine such a membership when sufficient conditions are satisfied.

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