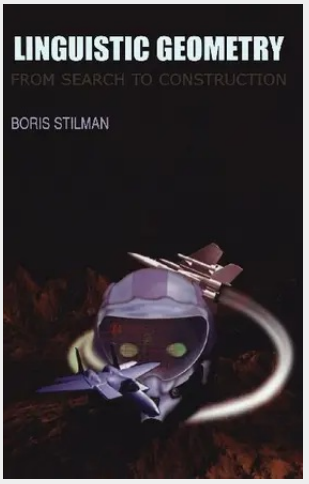
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Linguistic Geometry

From Search to Construction



is the first book of its kind. Linguistic Geometry (LG) is an approach to the construction of mathematical models for large-scale multi-agent systems. A number of such systems, including air/space combat, robotic manufacturing, software re-engineering and Internet cyberwar, can be modeled as abstract board games. These are games with moves that can be represented by the movement of abstract pieces over locations on an abstract board. The purpose of LG is to provide strategies to guide the games' participants to their goals. Traditionally, discovering such strategies required searches in giant game trees. These searches are often beyond the capacity of modern and even conceivable future computers.
LG dramatically reduces the size of the search trees, making the problems computationally tractable. LG provides a formalization and abstraction of search heuristics used by advanced experts including chess grandmasters. Essentially, these heuristics replace search with the construction of strategies. To formalize the heuristics, LG employs the theory of formal languages (i.e. formal linguistics), as well as certain geometric structures over an abstract board. The new formal strategies solve problems from different domains far beyond the areas envisioned by the experts. For a number of these domains, Linguistic Geometry yields optimal solutions.

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