

An Interactive Proof Study of Erdős-Szekeres Conjecture

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Abstract

In 1935, Erdős and Szekeres proved that for every integer $n \geq 3$, there is a minimal integer $ES(n)$ such that any set of $ES(n)$ points in the plane in general position contains n points in convex position. They showed that $ES(n) \geq 2^{n-2} + 1$ and conjectured this to be sharp.

There are many different variations of Erdős-Szekeres Conjecture. Two player game variant was studied by Kolipaka and Govindarajan in 2012.

In this paper, for the first time, the *Interactive Proof* Method was introduced to investigate the Erdős-Szekeres Conjecture. Compared to the two player game variant, interactive proof method uses more probabilistic properties of the distribution of points. The connection of this method to the design of randomized and deterministic algorithms to find the convex hull of n points for a given point set is also discussed.