Set $S \subset V$ is called secure set if $\forall_{X \subseteq S} |N[X] \cap S| \geq |N(X) \setminus S|$ [1]. That means that every subset of a secure set has at least as many friends (neighbour vertices in $S$) as enemies (neighbour vertices outside $S$) and will be defended in case of attack. Problem of determining if given set is secure is computationally hard, there is no polynomial time algorithm solving it.

Property testers are algorithms that distinguish inputs with a given property from those that are far from satisfying the property [3]. Property testers are allowed to be probabilistic and approximate in exchange for much reduced complexity.

In our work we apply the idea of testing to construct probabilistic and approximate algorithms for graph security problems that run in polynomial time. We formalize the testing model and propose various approaches for security testing and general methods of rating them. We take into account possibilities of practical application, algorithm complexity and quality of the approximation.

Keywords: alliance, secure set, property testing.

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References

