Oberseminar Theoretische Informatik
Wintersemester 2008/2009

Rosa Enciso

Alliances on Planar Graphs

Monday, December 1 at 2pm (c.t.)
in room 3319 (Ernst-Abbe-Platz 2, floor 3).

A defensive alliance in a graph $G = (V, E)$ is a non empty set $S \subseteq V$ where, for all $x \in S$, $|N[x] \cap S| \geq |N[x] - S|$. Alliances occur between nations, biological sequences, business cartels, as well as in several other application areas. If S is a defensive alliance, the vertices in $N[x] \cap S$ can defend an attack from vertices in $N[x] - S$, where $x \in S$. Consequently, every vertex x that is a member of a defensive alliance has at least as many vertices defending it as there are vertices attacking it. Therefore, an attack on a vertex in a defensive alliance can be neutralized by its defenders. A defensive alliance S is said to be global if $N[S] = V$, that is, S is also a dominating set of G.

Decision problems for several types of alliances, including defensive alliances, have been shown to be NP-complete (see [1] for a list of citations). Until recently, it was not known whether the (global) defensive alliance problem remained NP- complete when restricted to planar graphs or not. A transformation from the fixed embedding face cover problem is used to show the NP-completeness of the (global) defensive alliance problem on planar graphs. Lower bounds for the global defensive alliance number are presented which lead to a kernel size of $O(k)$ for the global defensive alliance problem.

Homepage:
http://theinf1.informatik.uni-jena.de/teaching/ws0809/oberseminar-ws0809