C. Paul and E. Protopapas : Tree-layout based graph classes : the case of proper chordal graphs

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Many standard graph classes are known to be characterized by means of layouts (a permutation of its vertices) excluding some patterns. Important such graph classes are proper interval graphs, interval graphs, chordal graphs but also permutation graphs, (co-)comparability graphs and so on.

For example, a graph $G = (V, E)$ is an interval graph if and only if G has a layout $\mathbf{L}$ such that for every triple of vertices such that $x \prec_{\mathbf{L}} y \prec_{\mathbf{L}} z$, if $xz \in E$, then $xy \in E$. We call such a layout an *interval layout*. Proper interval graphs are characterized by excluding *indifference triples*, defined as triples $x \prec_{\mathbf{L}} y \prec_{\mathbf{L}} z$ such that if $xz \in E$, then $xy \in E$ and $yz \in E$

In this talk, we investigate the concept of *tree-layouts*. A tree-layout $\mathbf{T}$ of a graph $G = (V, E)$ is a rooted tree (T, r) equipped with a one-to-one mapping between V and the node of T such that for every edge $xy \in E$, either x is an ancestor of y, denoted $x \prec_{\mathbf{T}} y$, or y is an ancestor of x. Excluding a pattern in a tree-layout is defined similarly as excluding a pattern in a layout, but now using the ancestor relation. It can be easily observed that chordal graphs are characterized by the existence of a tree-layout that excludes the interval pattern discussed above. As a proof of concept, we show that excluding indifference triples in tree-layouts yields a natural graph class of *proper chordal graphs*. We will position proper chordal graphs with respect to other known graph classes and explore its structural and algorithmic aspects.