Experiments

- Tree Ensemble Verification
  - Given a single tree and a $\ell_{\infty}$ bounded perturbation added to $x$, we can obtain reachable leaves for each tree using the single tree analysis. If a reachable leaf of the first tree overlaps with a reachable leaf of the second tree, we add an edge between them.

  **Theorem:** The graph connecting all reachable leaves of $K$ trees with $d$ features is a $K$-partite graph with boxicity $d$.

Multi-level Relaxed Verification

Finding K-cliques on all K trees can be expensive. We can group K trees to M groups and find $(K/M)$-cliques inside each group, and consider the worst case for each.

Robustness Verification of Tree-based Models
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Source code (XGBoost compatible!): https://github.com/chenhongge/treeVerification