

Correspondence between Critical Portraits and Weakly Bicolored Trees

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Abstract: Critical portraits can be represented by weakly bicolored trees. Weakly bicolored trees are comprised of **P** and **F** nodes. **P** nodes represent regions with a non-zero rotation. **F** nodes represent regions that contain fixed points. **F** nodes may be adjacent to other **F** nodes, but **P** nodes may not be adjacent to other **P** nodes. For degree d , a unit disk with a maximal number of non-crossing chords of critical length (each length k/d for some k) that can only meet at endpoints is called a *critical portrait*. One can easily map from a critical portrait to a corresponding tree in a fashion that is complete and unambiguous. The interesting cases arise when mapping from a tree to a corresponding critical portrait. Only in the case of trees which are fans do we have a correspondence that is one-to-one. Other weakly bi-colored trees can only be mapped to families of critical portraits since their correspondence is not one-to-one. We explore possible bounds on the number of portraits in these families based on the number of edges on a tree.