

## **Combining taxonomies for classification: when are sharks and dolphins similar?**

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We present novel methods of fusing taxonomies in an effort to resolve conflicts that arise when designing taxonomies. Current taxonomies are often expert-created structures, which can produce bias towards certain classes. For instance, a taxonomy system for classifying living organisms may look different if the expert used biomes or species relationships. We focus on taxonomies which can be represented as labeled rooted directed trees, also called arborescences. We present methods of fusing arborescences in a way that preserves underlying structure using a set-theoretic perspective. Hierarchical classification considers class relationships and can give a coarser result if a specific class is unable to be determined. We compare whether fused arborescences improve hierarchical classification compared to the original expert-defined trees. Our findings suggest that these fused graphs show some improvement in metrics such as tree-induced error.

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