A Generalized Mixture Framework for Multi-label Classification

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Prepared for the 2015 SIAM International Conference on Data Mining
Target Problem: Multi-label Classification

- In MLC, each data instance can be associated with multiple class variables
- Examples

- One solution to the MLC problem is to exploit the dependency relation among class variables
- We can efficiently perform learning and classification by assuming the dependency relation forms a chain or tree structure [Read et al. 2009; Batal et al. 2013]
Claim: Dependency relation in a dataset could be complex

- What if there exist multiple dependency relations that tend to change across a dataset?
- Example

- Existing methods may not be sufficient because they are designed to capture a fixed dependency relation.
Our Solution: **Multi-label Mixtures-of-Experts (ML-ME)**

- We present a way to discover and exploit a rich set of dependency relations by developing a mixture framework for the MLC problem.
- Our framework incorporates multiple probabilistic MLC models.
  - Each model decomposes the class posterior $P(Y_1, ..., Y_d|X)$ using a product of the posteriors over individual class variables.
  - Using mixtures, we improve the prediction accuracy (exact match) up to 27% and the model fitness (conditional log-loss) up to 59%.

Thanks & See You at the Poster Session!

- For more technical details and experimental results, please stop by our poster (Poster# 34).