Field-Guide Inspired Zero-Shot Learning

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Contributions
- ‘Tree Swallow’ has iridescent blue wings attribute unknown to learner.
- New field-guide-inspired interactive ZSL approach.
- New querying strategies, to actively query expert attributes to rapidly train the learner.
- Policies that can choose different number of attributes.
- Bridging the gap between attribute understanding of humans and machines.
- Policies leveraging already selected attributes.
- Policies that can choose different number of attributes.
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Problem
Zero-shot learning is not really “zero-shot”. 100s of annotations are required for each class. Can this annotation cost be reduced?

Field-guides
- Field-guide authors do not describe all the attributes for a novel category.
- The “color” of Mistle Thrush is more buff than Song Thrush.
- Learner queries to experts.

Querying Policy
1. Sibling-variance:
   - Select attributes with higher variance in a taxonomy branch.
   - Requires taxonomy for base classes.
2. Representation-change:
   - Select attribute resulting in most change in latent representation locally.

Results
- Field-guide way of annotations is better than traditional ZSL and unsupervised ZSL.
- Generalized to other ZSL models such as TF-VAEGAN.
- Both querying policies improve the performance of field-guide.
- Querying policies are better than human experts.

Take-away
- With only 35% of total annotations, one can get full model performance on SUN and CUB. Saving more than 32 hours of expert annotation cost on CUB.
- Learner oriented querying policies lead to better performance.

Future Work
- Policies that choose different number of attributes.
- Bridging the gap between attribute understanding of humans and machines.
- Policies leveraging already selected attributes.

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