Hierarchical Novelty Detection for Visual Object Recognition

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Why Hierarchical Novelty Detection?

- Conventional novelty detection framework does not provide more information than "novelty" of an object.
- Our hierarchical novelty detection framework aims to find the most specific class label of any data on the hierarchical taxonomy built with known labels.

Approach

- a. Top-down (TD) method
- b. Leave-one-out (LOO) method

Experimental Results

- a. Compared algorithms
- b. Quantitative results
- c. Qualitative results

References


Hierarchical Taxonomy

- Class types
  - Known leaf class
  - Super class
  - Ancestor of leaf classes, also known Novel class
- Method
  - Leave-one-out
  - Classification rule:

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Training objective: \[ \min_{\theta} E_{P_{\mathcal{D}}}[\log P(y|x;\theta)] = \sum_{y \in \{0,1\}} \log P(N(P(o))|x;\theta) + \lambda \]

Classification rule: \[ \hat{y} = \arg \max_{y} P(y|x;\theta), \quad \text{if confident,} \quad \hat{y} = \arg \max_{y} N(s), \quad \text{otherwise.} \]

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