**Content Based Auto-tagging of Flickr Images**

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**Motivation**

- Social photo sharing sites are growing fast
- There are too many images for users to tag carefully.
- Most images are not tagged with relevant tags and thus not easily accessible by text search.

**Challenges**

- Many images have incorrect tags

**Goal**

- Remove visually irrelevant tags
- Suggest new tags for images (even if not previously tagged)

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**Image similarity via ImageWebs**

- **Image Web** - A graph where vertices are regions of an image corresponding to similar objects and edges specify relations between the regions.

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**Building Image Webs**

Steps to add an image to an image web

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**Computation**

- Distributed on a cluster with 500 cores
- 50,000 images ~ 70 minutes

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**Approach**

**Tag Cleaning:** Simulate the ESP game by taking the intersection of tag sets of similar images created by different users*

**Tag Suggestion:** Create a graph of visually similar images and propagate clean tags to neighbors in this graph**

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**Results**

**Stanford Dataset:** 195,268 Flickr images with title, description, or tag containing "Stanford" used to construct an Image Web containing 1,132,486 extracted image regions. The tag cleaning step resulted in 525 distinct clean tags.

**Tagging summary**

<table>
<thead>
<tr>
<th>Provided Tags</th>
<th>Cleaned Tags</th>
<th>Suggested Tags</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Images</td>
<td>169,171</td>
<td>13,813</td>
</tr>
<tr>
<td>Percent of Dataset</td>
<td>86%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

Note that the percent of images with provided tags is quite high because this dataset was collected by finding image with the keyword "stanford" in one of several text fields.

**Tagging examples**

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*Based on approach in: Lukas Csebray, Marco Steiner, Anil Thapar, "Image Webs: Similarity Based Tagging via Webgraph," in 14th CIKM, 2005.

**Based on approach in: W. Li, E. Demaine, J. W. Shewchuk, "Image Annotation via Graph Learning," in 15th CIKM, 2006.*