PhotoStand: A Map Query Interface for a Database of News Photos

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PhotoStand

1. Utilizes NewsStand system which crawls and downloads new articles from RSS feeds
2. Cluster each article by its text and identify geographic locations
   • Associate each cluster with a set of locations along with their frequency of appearance in the cluster
3. Extract, rank, and display images on a map based on the location or locations associated with the article from which the images come
4. Currently web, Android, and iOS implementations of PhotoStand exist

PhotoStand Queries

1. Map Marker Selection:
   • Show image thumbnails as place markers using a Multi-Resolution Select Distinct Query to query a database for photos to display
   • Query returns “distinctive” objects that are more important than nearby or far away from more important objects, along with a measure of their “distinctiveness”
   • Efficient query format considers only O(m) objects, where m is the desired number of objects to display in the query window
   • Objects returned by the query can be displayed with different sizes based on their distinctiveness
2. Map Viewing Window:
   • Can change viewing window by pan, swipe, pinch or buttons on map
   • Can narrow viewing window by specifying a specific location
3. Filtering Images:
   • Specify a keyword to limit the results to images that only contain the keyword in their caption or the title of the corresponding articles
   • Can filter by topic (such as business, sports or entertainment)
   • Can filter by source, country, or language

Image Extraction & Ranking

1. Extract HTML from news articles to find any images and their associated captions by looking at the HTML tags
2. Try to match terms of caption with the document’s cluster’s term centroid
   • Match found – keep image (blue)
   • Not found – discard image (red)
3. Use modified version of Jaccard Index to score each image for each location associated with containing article
   • Use unique location keywords (loc) and their frequency (freq) in the article’s cluster to score image based on caption words (capt)
   \[
   \text{score} = \frac{1}{\text{dist}} \cap \text{freq} \left( \text{loc} \right) \cup \text{freq} \left( \text{capt} \right)
   \]
4. Weight resulting score by recency of article that contains image
   • Ensures more recent images are higher scored and that the highest scoring image will not permanently remain the highest

PhotoStand User Interface

1. Selecting an image marker, displays the location name along with the image caption in a popup info window
2. Tapping on info window gives a grid of images associated with a given location
   • Images are sorted in descending order of their score
3. Mark duplicate images (shown shaded) by tapping “Mark Dups” or remove by selecting “Hide Dups”
4. Tap “Topics” to select images by topic
   • Display a spaced grid of images with one representative image from each cluster
      • Selecting an image enlarges it and a “More in Topic” button appears to display all images in the cluster
5. Select an image to enlarge in same proportions as original image and display image’s caption underneath the photo
6. Swipe to navigate through grid of images
7. Magnifying glass button enlarges the image and allows for displaying images one at a time
8. Select an enlarged image to show the corresponding article where the image was downloaded

Statistics

1. PhotoStand and NewsStand systems currently have a PostgreSQL database size of 300 gigabytes
2. NewsStand downloads over 50,000 news articles each day
   • Crawl 10,000+ RSS feeds from 15 different languages and 70 nations
3. Over 12,000 images from these articles are determined daily to be relevant to the article and scored
4. Approximately 90% of images are unique images while remaining 10% are duplicate or near duplicate images

Future Work

1. Currently, only use article text to geotag and captions to score images
   • Could extend to use image features to better score
2. Improve duplicate image detection to account for perspective, extreme cropping and variations in time
3. Use facial recognition to identify persons in image
   • Could be done by image search by face

For more information, see the web version of PhotoStand: http://newsstand.unicef.umd.edu/photos tand

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