Information Retrieval Assignment 2
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1) Image Feature Extraction

Approach:
-> Utilized pre-trained Convolutional Neural Network (CNN) for feature extraction, specifically used ResNet50.
-> Implemented image pre-processing techniques such as resizing, normalization, and data augmentation to enhance model performance.

Methodologies:
-> Loaded pre-trained CNN models using TensorFlow.
-> Applied image pre-processing techniques using libraries like OpenCV or PIL.
-> Extracted features from images using the pre-trained CNN models and normalized them.

Assumptions:
-> Assumed that using pre-trained CNN models would capture high-level features from images effectively.

2) Text Feature Extraction:

Approach:
-> Implemented various text pre-processing techniques including lowercasing, tokenization, punctuation removal, stop word removal, stemming, and lemmatization.
-> Calculated Term Frequency-Inverse Document Frequency (TF-IDF) scores for text reviews.

Methodologies:
->Utilized NLTK and scikit-learn libraries for text pre-processing and TF-IDF score calculation.

Assumptions:
->Assumed that pre-processing techniques would improve the quality of textual representations and remove noise.

3. Image Retrieval and Text Retrieval:

Approach:
-> Implemented cosine similarity to find the most similar images and reviews based on extracted features and TF-IDF scores, respectively.
->Saved the results using Python's pickle module.

Methodologies:

-> Used cosine similarity to compute similarity scores between input and extracted features.
-> Saved the results in pickle files.

Assumptions:
-> Assumed that cosine similarity would effectively measure the similarity between feature vectors.
-> Assumed that saving results using pickle would provide efficient storage and retrieval.

4. Combined Retrieval (Text and Image):

Approach:
-> Calculated composite similarity scores by calculating average of the similarity scores obtained from image and text retrieval.
-> Ranked the pairs based on the composite similarity scores.

Methodologies:
-> Combined similarity scores obtained from image and text retrieval tasks
-> Ranked the pairs based on composite similarity scores to identify top-ranked pairs.

Assumptions:
-> Assumed that averaging similarity scores would provide a balanced measure of similarity between images and reviews.
-> Assumed that ranking based on composite scores would prioritize pairs with balanced similarity in both modalities.

5. Results and Analysis:

Approach:
->Presented top-ranked (image, review) pairs along with cosine similarity scores and compared the performance of image and text retrieval techniques.
-> Discussed challenges faced during implementation and potential improvements.

Methodologies:
-> Analyzed and presented the results using Python
-> Discussed challenges faced and potential improvements
Assumptions:
-> Assumed that top-ranked pairs with higher similarity scores represent more relevant matches between images and reviews.

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