Report Assignment 2

Mo Rashid MT23047

Question1: Image Feature Extraction =>

Overview: For Problem 1, the task was to extract features from images using a pre-trained ResNet50 model. The extracted features were then normalized and saved using pickle.

I utilized the ResNet50 model pre-trained on the ImageNet dataset for feature extraction. Image pre-processing involved resizing, applying random flips, and brightness adjustment to enhance feature extraction. Features were extracted from each image and flattened to create a feature vector. The extracted features were normalized and saved as a dictionary using Pickle.

Question 2:

Performed text pre-processing steps, including HTML tag removal, tokenization, stop word removal, stemming, and lemmatization. Calculated term frequencies and TF-IDF scores from scratch. Saved the TF-IDF scores using pickle for later use.

Key: Loving these vintage springs on my vintage strat. They have a good tension and great stability. If you are floating your bridge and want the most out of your springs than these are Value: [0.17063740955725884, 0.5574870578984413, 0.6624272366585359, 0.2290869802813264, 0.171399912420283, 0.14332661723291976, 0.32379520762790565, 0.11885746017713138, 0.32379520767

Key: Works great as a guitar bench mat. Not rugged enough for abuse but if you take care of it, it will take care of you. Makes organization of workspace much easier because screws wor Value: [0.08501164029173598, 0.0737359597201258, 0.07801063383927238, 0.2487795896007652, 0.2487795896007652, 0.17731025422787897, 0.1969148517808937, 0.122010600091431433, 0.234798034

Key: We use these for everything from our acoustic bass down to our ukuleles. I know there is a smaller model available for ukes, violins, etc.; we haven't yet ordered those, but these they benefit has been when writing music at the computer and needing to set a guitar down to use the keyboard/mouse - just easier for me than a hanging stand.

We have several and gave one to a friend for Christmas as well. I've used mine on stage, and it folds up small enough to fit right in my gig bag.

Value: [0.08090719194238329, 0.05712461105462584, 0.05648720806773133355, 0.0505239393067205895, 0.06309395535562541, 0.1972272964836133, 0.054198788498639856, 0.13074687843980787, 0.065

Key: Great price and good quality. It didn't quite match the radius of my sound hole but it was close enough.

Value: [0.15281673451345642, 0.0232257318539407, 0.1842770729946827, 0.20693714177765295, 0.14691421064595686, 0.14911945347355537, 0.31728709829874363, 0.3294227437841291, 0.48636735

Key: I bought this bass to split time as my primary bass with my Dean Edge. This might be winning me over. The bass boost is outstanding. The active pickups really allow you to adjust Value: [0.05902562274933566, 0.3235304889303535, 0.1265720719021437, 0.085589086466530126, 0.11945064895287767, 0.11441159505021484, 0.09122286

Question 3:

We take the input URL and corresponding text URL and extract the features from the saved pickle file.

Image-Based Retrieval: In Image-Based Retrieval, we retrieve the top result based on the image's similarity and also calculate the retrieved text similarity using the input text review.

Image URL: https://images-na.ssl-images-amazon.com/images/I/R1Q5+IXFVUL._SY88.jpg
Similarity with Given Review : 1.0

Image URL: https://images-na.ssl-images-amazon.com/images/I/712LuK8v2+L._SY88.jpg
Similarity with Given Review : 1.0

Image URL: https://images-na.ssl-images-amazon.com/images/I/712LuK8v2+L._SY88.jpg
Similarity: 0.34599608149528593
Review Text: Not damn! I replaced the original neck position humbucker on my 1980 Les Paul (which I bought new) with a SPH90 Phat Cat. What a difference!! It is MUCH louder, and br: Similarity with Given Review: 0.6162054976570459

Image URL: https://images-na.ssl-images-amazon.com/images/I/71IJnFDPNLL.SY88.jpg
Similarity: 0.2966170907020569
Review Text: Nis was an easy installation. Used it on a recent tele build. Fits right in with hand pressure. Used some light taps with a rubber mallet to seat a few that weren't exact Similarity with Given Review: 0.6754402633300342

Review-Based Retrieval: In Image Based Retrieval, we retrieve the top result based on the Review similarity and also calculate the Retrieved Image similarity based on the input given image Features.

Top Similar Images Based on Review Text Similarity:
Review: Loving these vintage springs on my vintage strat. They have a good tension and great stability. If you are floating your bridge and want the most out of your springs than these Cosine similarity of text: 1.0

Similar Images:
1) Image Unit: https://images-na.ssl-images-amazon.com/images/I/81q5+1xFVUL. SY88.jpg
Cosine similarity of images: 0.9999997615814209

Review: This is a nice mic boom. I have tried a lightweight usb mic on this and I even put a MMX 990 mic on this and that mic is heavy. This boom even holds that mic up so I am impres:
Cosine similarity of text: 0.934296309051642

Similar Images:
1) Image Unit: https://images-na.ssl-images-amazon.com/images/I/51lElCmVyNL_SY88.jpg
Cosine similarity of images: 0.1669592261314392

Review: I use this with the Zoom G3n and it works well as an expression pedal. Good value, solid build quality, so far so good.

Cosine similarity of text: 0.9271913130989162

Similar Images:
1) Image Unit: https://images-na.ssl-images-amazon.com/images/I/81wpla0rPvL, SY88.jpg

Question 4:

Cosine similarity of images: 0.14851407706737518

Combined the individual similarity scores from image-based and text-based retrieval techniques to calculate a composite score. Ranked the pairs based on the composite score to identify top similar pairs. Methodologies:

Top Similar Images Based on Review Text Similarity:

1) Image URL: https://images-na.ssl-images-amazon.com/images/I/8105+IXFVUL._SY88.jpg
Review: Loving these vintage springs on my vintage strat. They have a good tension and great stability. If you are floating your bridge and want the most out of your springs than the Cosine similarity of text: 1.000
Cosine similarity of text: 1.000
Composite similarity: 1.0000

1) Image URL: https://images-na.ssl-images-amazon.com/images/I/71IJnFDpNLL._SY88.jpg
Review: Loving these vintage springs on my vintage strat. They have a good tension and great stability. If you are floating your bridge and want the most out of your springs than the Cosine similarity of images: 0.0000
Cosine similarity of text: 0.675
Composite similarity: 0.8377

1) Image URL: https://images-na.ssl-images-amazon.com/images/I/712LuK8v2+L._SY88.jpg
Review: Hot damn! I replaced the original neck position humbucker on my 1980 Les Paul (which I bought new) with a SPH90 Phat Cat. What a difference!! It is MUCH louder, and brigk Cosine similarity of images: 0.3451
Cosine similarity of images: 0.3451
Cosine similarity of text: 0.616
Composite similarity: 0.4807

Question 5:

Challenges:

- 1. Understanding what users want is hard because sometimes they don't explain well or use unclear words.
- 2. Words can mean different things, like "Python" can refer to both a programming language and a snake.
- 3. There's so much information online that it's easy to get overwhelmed with too many search results.
- 4. Finding images, videos, and audio can be tough because there's so much of it, and it's not just text.

Potential Improvements:

- 1. Use natural language processing to better understand what users are asking for.
- 2. Keep updating search results in real-time so users get the latest information.
- 3. Use context like location or past searches to give more relevant results.
- 4. Ask users for feedback to improve search results and ranking.