

# Report

## 1. Methodology :

1) Image Preprocessing techniques: Resizing the image, conversion to RGB, applying rotation and applying normalization.

2) Feature Extraction Technique: ResNet is used as a Pretrained model which is trained on the ImageNet dataset.

3) Approach: First of all we fetch images from their URLs, then preprocess it and then extract features out of it, and store them with a corresponding product ID into a dictionary.

4) Text Preprocessing techniques: Lowercasing, Tokenization, Removing punctuations and stopwords, and Lemmatization.

5) Calculation for TF-IDF: we've computed it with the help of three auxiliary methods: `compute_tf()`, `compute_idf()` and `compute_tfidf()`.

6) Calculation for Cosine Similarity: cosine similarity is being calculated for both image features and TF-IDF vectors after applying normalization first in the self defined `cosine_similarity()` method to take care of inconsistency in the lengths of the two vectors.

7) the top three documents are ranked based on (Image feature cosine similarity/ TF-IDF score cosine similarity/ Composite score)

## 2. Results :

For an input :

**Image and Text Query Input :**

Image: [https://images-na.ssl-images-amazon.com/images/I/71bztfqdg+L.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/71bztfqdg+L._SY88.jpg)

Review: I have been using Fender locking tuners for about five years on various strats and teles. Definitely helps with tuning stability and way faster to restring if there is a break.

### Top 3 Similar Images

```
[(1136,
  'https://images-na.ssl-images-amazon.com/images/I/71NF8wyAN6L._SY88.jpg',
  array([[0.02360917]], dtype=float32)),
(1451,
  'https://images-na.ssl-images-amazon.com/images/I/71z5Z6TDz7L._SY88.jpg',
  array([[0.02358717]], dtype=float32)),
(1737,
  'https://images-na.ssl-images-amazon.com/images/I/716AkwPzvqL._SY88.jpg',
  array([[0.02324674]], dtype=float32))]
```

### Top 3 Similar Texts:

```
[(3452,
  '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 the way to go.',
  array([[ -1.]])),
(1205,
  '"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 won't roll around. Color is good too."',
  array([[ -1.]])),
(1708,
  '"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 will work on smaller instruments if one doesn't extend the feet to their maximum width. They're gentle on the instruments, and the grippy material keeps them secure.\n\nThe greatest 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.\n\nWe 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."',
  array([[ -1.]]))]
```

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### USING IMAGE RETRIEVAL

#### 1) **Image URL:**

[https://images-na.ssl-images-amazon.com/images/I/71NF8wyAN6L.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/71NF8wyAN6L._SY88.jpg)

**Review:** Guys, this is a really good sounding pedal. It has enough highs-lows-mids to make you smile. The sound is similar to pedals costing much more. Of course, everything is based on taste and the kind of music you play. This is not a super scooped metal pedal. It's best for strong overdrives and smooth grudge sounds. The big factor about this pedal compared to more expensive pedals is that it doesn't like HEAT. I had a gig in Detroit on a metal stage with a 100 degree PLUS day. The pedal

didn't like it at all. My BOSS Blues driver was just fine. Of course the Blues Driver is a \$100 pedal. It took the temps just fine. So, that is, in my opinion, the big difference between what you get with JOYO vs other, more expensive, pedals. Keep in mind, if you are not playing in 100 degree temperatures you have nothing to fear. So, rock on and enjoy your music!!

Cosine Similarity of images: 0.02360917441546917

Cosine Similarity of text: -1.0

Composite Similarity score: -0.4881954127922654

## 2) Image URL:

[https://images-na.ssl-images-amazon.com/images/I/71z5Z6TDz7L.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/71z5Z6TDz7L._SY88.jpg)

**Review:** I had this put together in less than 5 minutes, and made my 3-guitar stand a 4-guitar stand.

Cosine Similarity of images: 0.023587174713611603

Cosine Similarity of text: -1.0

Composite Similarity score: -0.4882064126431942

## 3) Image URL:

[https://images-na.ssl-images-amazon.com/images/I/716AkwPzvqL.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/716AkwPzvqL._SY88.jpg)

**Review:** Amazon's product states that this shock mount fits 43 to 50mm diameter mics. It does not. It will not even fit my MXL V69XM which specs out at 47 mm diameter. See the photos ... it does not fit even with a white-knuckle effort to open the jaws. I ordered three through Amazon and none of them came in a Neewer box that was shown. Grossly under-size! I was able to reach into the inside of the shock and stretch the band open more. Was able to save 2 of 3 shocks. The third one can be seen in the attached photo with an insulator that was cut too short and was rusting inside. This one is going back.

Cosine Similarity of images: 0.023246735334396362

Cosine Similarity of text: -1.0

Composite Similarity score: -0.4883766323328018

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## USING TEXT RETRIEVAL

### 1) Image

**URL:** [[https://images-na.ssl-images-amazon.com/images/I/81q5+IxFVUL.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/81q5+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 these are the way to go.

Cosine Similarity of images: 0.02278394252061844

Cosine Similarity of text: -1.0

Composite Similarity score: -0.4886080287396908

### 2) Image

**URL:** [[https://images-na.ssl-images-amazon.com/images/I/71HSx4Y-5dL.\\_SY88.jp](https://images-na.ssl-images-amazon.com/images/I/71HSx4Y-5dL._SY88.jp)]

g, [https://images-na.ssl-images-amazon.com/images/I/71dVsYejzTL.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/71dVsYejzTL._SY88.jpg),  
[https://images-na.ssl-images-amazon.com/images/I/71domStNfIL.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/71domStNfIL._SY88.jpg)]

**Review:** 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 won't roll around. Color is good too.

Cosine Similarity of images: 0.020013228058815002

Cosine Similarity of text: -1.0

Composite Similarity score: -0.4899933859705925

### 3) Image

**URL:** [[https://images-na.ssl-images-amazon.com/images/I/71Md5ihUFL.\\_SY88.jpg](https://images-na.ssl-images-amazon.com/images/I/71Md5ihUFL._SY88.jpg)]

**Review:** 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 will work on smaller instruments if one doesn't extend the feet to their maximum width. They're gentle on the instruments, and the grippy material keeps them secure.

The greatest 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.

Cosine Similarity of images: 0.019889485090970993

Cosine Similarity of text: -1.0

Composite Similarity score: -0.4900552574545145

## 3. Analysis :

Between these two retrieval techniques, the image based retrieval approach provides better results as compared to text based retrieval approach. Because we get a better representation of features, thus the cosine similarity score is higher than the vectors using TF-IDF score based similarity.