

Neck-Less Searching

Instantly find that necklace you've been looking for!



Eleanor Middlemas



Etsy

Search for items or shops



Sell on Etsy



Fav

Jewelry & Accessories

Clothing & Shoes

Home & Living

Wedding & Party

Toys & Entertainment

Art & Collectibles

Crafts

[Home](#) > [Jewelry](#) > [Necklaces](#) (3,779,642 items)

Necklaces

[← All categories](#)

[← Jewelry](#)

Necklaces

Pendants

Beaded Necklaces

[+ Show more](#)

Special offers

FREE shipping

On sale

Ready to ship in

1 business day

1 – 3 business days

Price (\$)

Any price

Under \$25

\$25 to \$50

\$50 to \$100

Over \$100

Custom

Low to High



NECKLACES
Pendants



NECKLACES
Beaded Necklaces



NECKLACES
Charm Necklaces



NECKLACES
Crystal Necklaces



NECKLACES
Chains



NECKLACES
Monogram &
Name Necklaces



NECKLACES
Lockets





Etsy

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Jewelry & Accessories Clothing & Shoes Home & Living Wedding & Party Toys & Entertainment Art & Collectibles Craft

Home > Jewelry > Necklaces (3,779,642 items)

Necklaces

← All categories

← Jewelry

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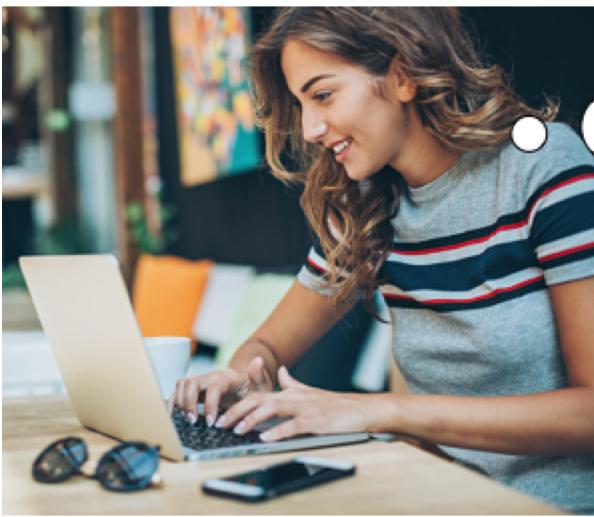
Low to High >

Search queries?



NECKLACES
Crystal
Necklaces





Etsy

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Jewelry & Accessories Clothing & Shoes Home & Living Wedding & Party Toys & Entertainment Art & Collectibles Craft

Home > Jewelry > Necklaces (3,779,642 items)

Necklaces

- ← All categories
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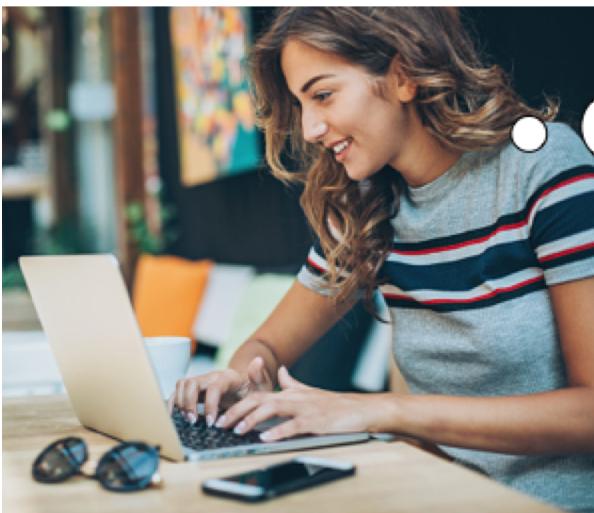


NECKLACES
Crystal Necklaces

Ad

Ad

Ad



Etsy

Sell on Etsy

Jewelry & Accessories Clothing & Shoes Home & Living Wedding & Party Toys & Entertainment Art & Collectibles Craft

Home > Jewelry > Necklace (3,779,642 items)

Necklaces

-
-
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Low High >

SHIPS NEXT DAY

Search queries?

THREE MILLION NECKLACES?!

NECKLACES
Crystal Necklaces

Ad Ad Ad



Can we use Etsy data to help speed up the necklace-searching process?

Yes, with a little help of a computational friend.



Go find that necklace!



How does Neck-Less Searching work?



How does Neck-Less Searching work?

Use an image classifier to bypass search queries



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Use an image classifier to bypass search queries

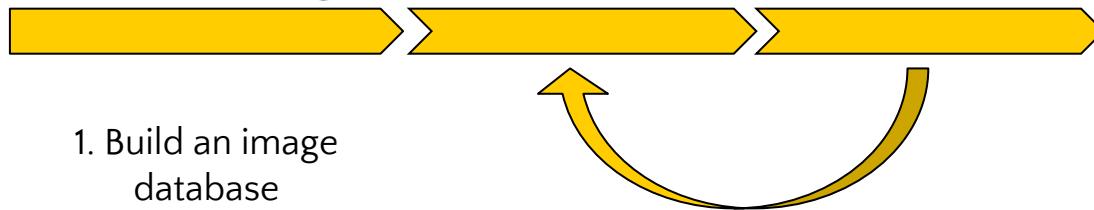


1. Build an image database



How does Neck-Less Searching work?

Use an image classifier to bypass search queries



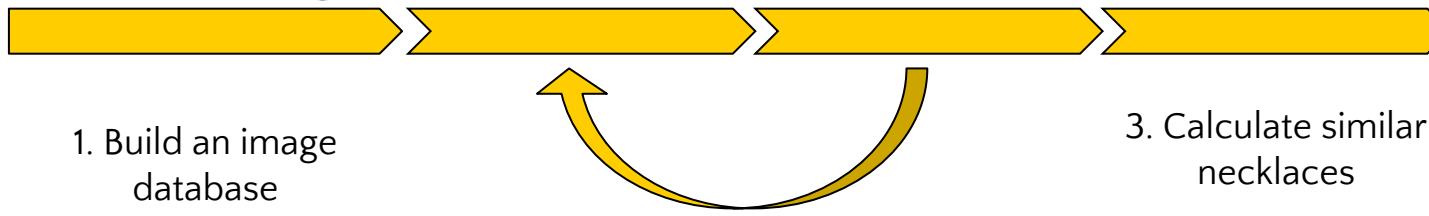
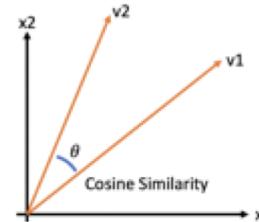
1. Build an image database

2. Use an image classifier to identify necklaces & produce feature vectors



How does Neck-Less Searching work?

Use an image classifier to bypass search queries



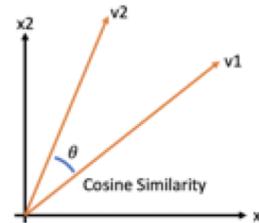
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3. Calculate similar necklaces



How does Neck-Less Searching work?

Use an image classifier to bypass search queries



1. Build an image database

2. Use an image classifier to identify necklaces & produce feature vectors

3. Calculate similar necklaces

4. Make available for everyone





Labels needed to train the image classifier to identify necklaces...

But many of the Etsy-provided labels are incorrect or misleading.

BeadedNecklaces



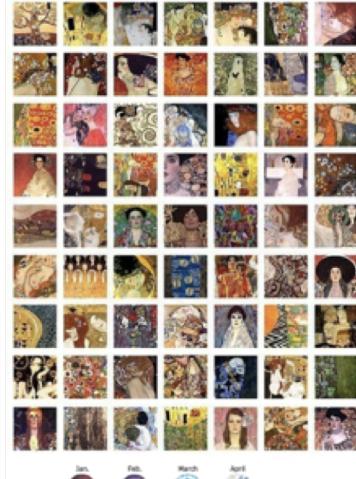
BeadedNecklaces





In fact, half aren't even clearly necklaces!

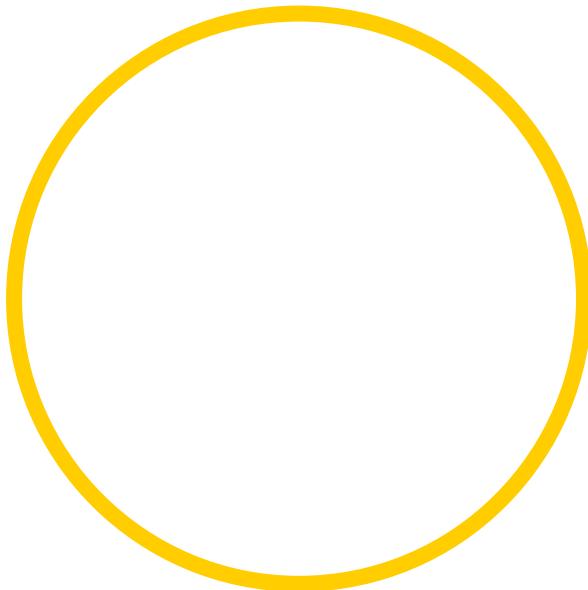
Use **binary classification** to separate necklaces from non-necklaces.



Jan.	Feb.	March	April
Garnet	Amethyst	Aquamarine	Crystal
May	June	July	Aug.
Emerald	U. Amethyst	Ruby	Hematite
Sept.	Oct.	Nov.	Dec.
Sapphire	Rose	Topaz	Blue Zircon

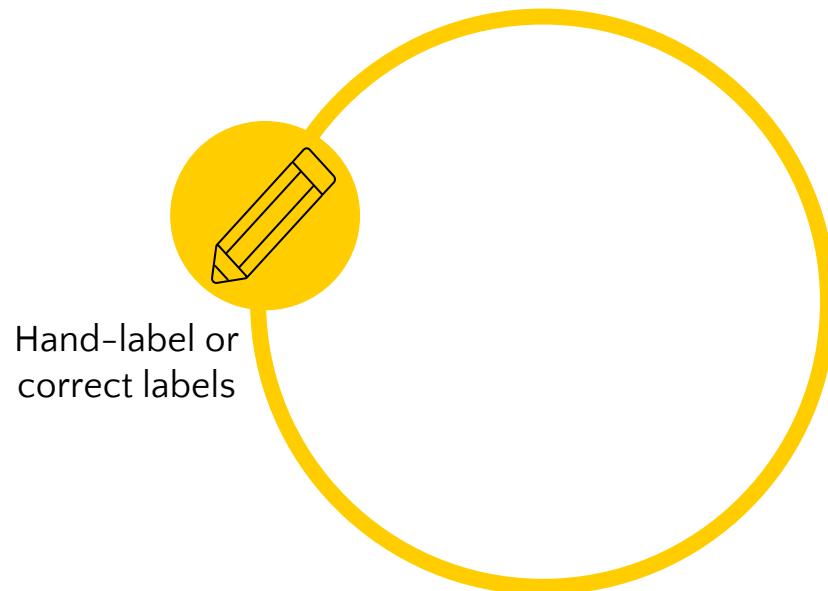


Semi-supervised learning to teach the model to identify necklaces & their features



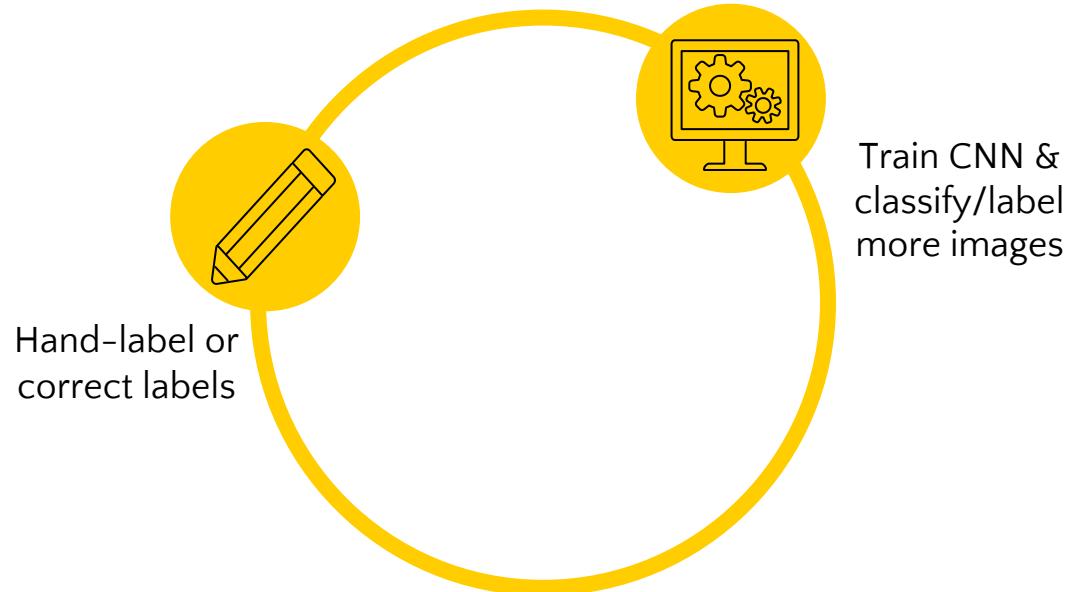


Semi-supervised learning to teach the model to identify necklaces & their features



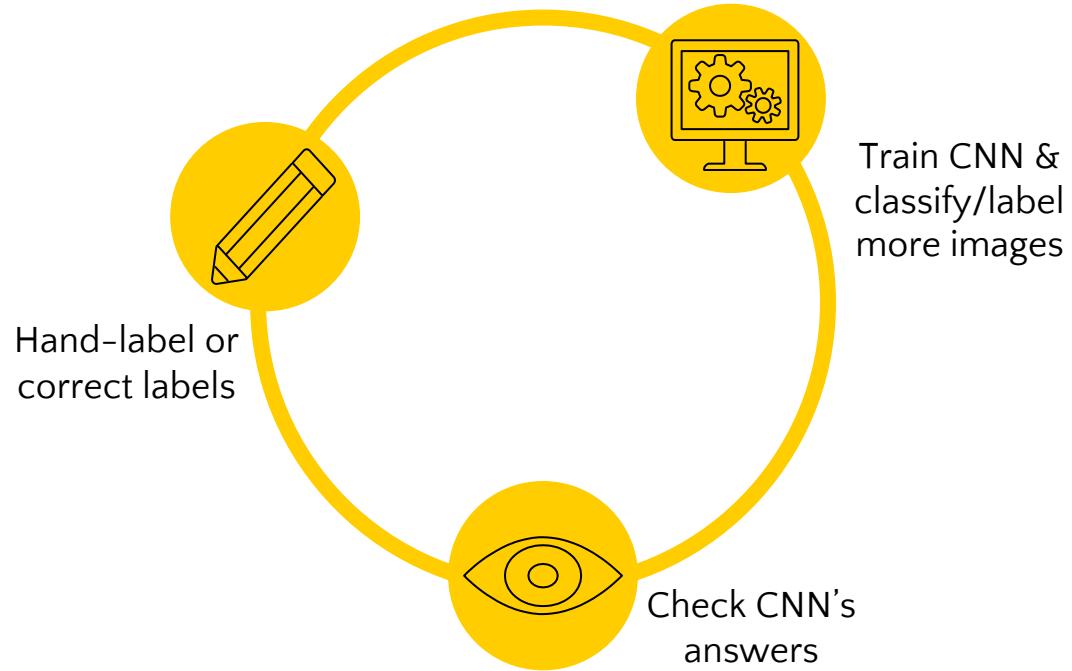


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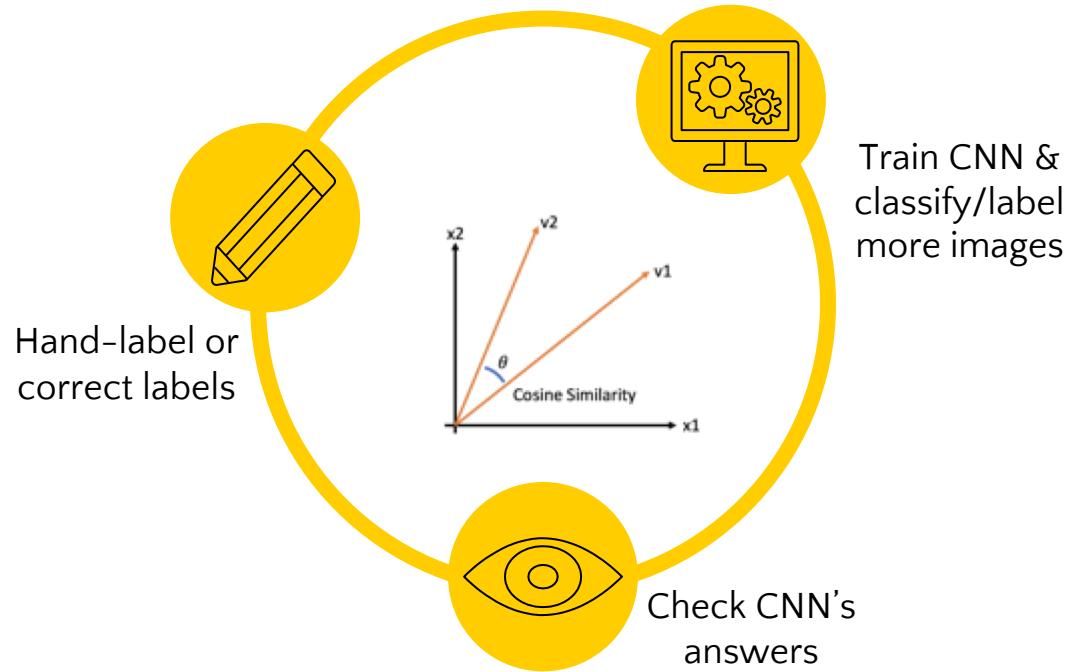


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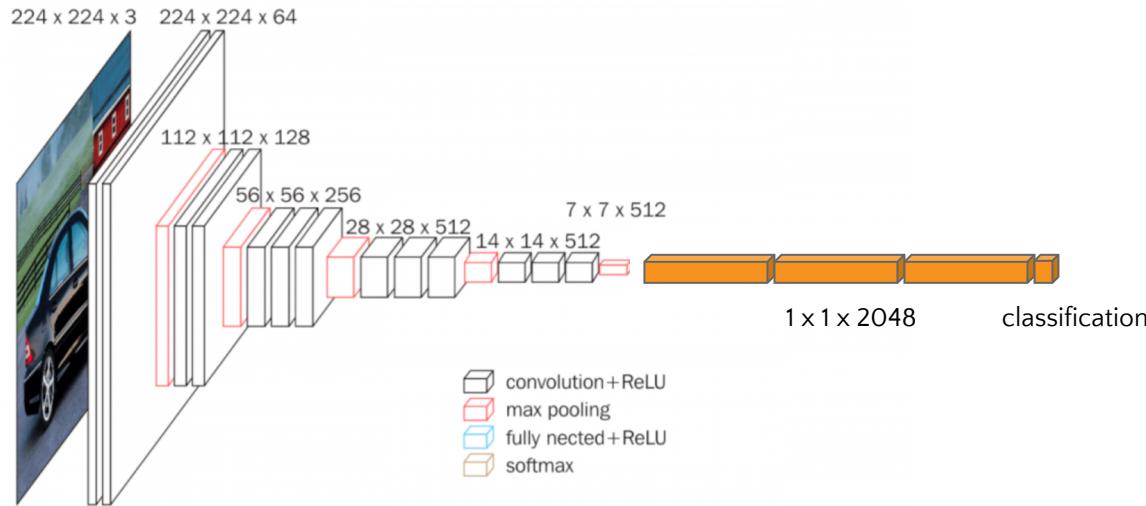
Semi-supervised learning to teach the model to identify necklaces & their features



Accuracy	0.85
F1	0.72



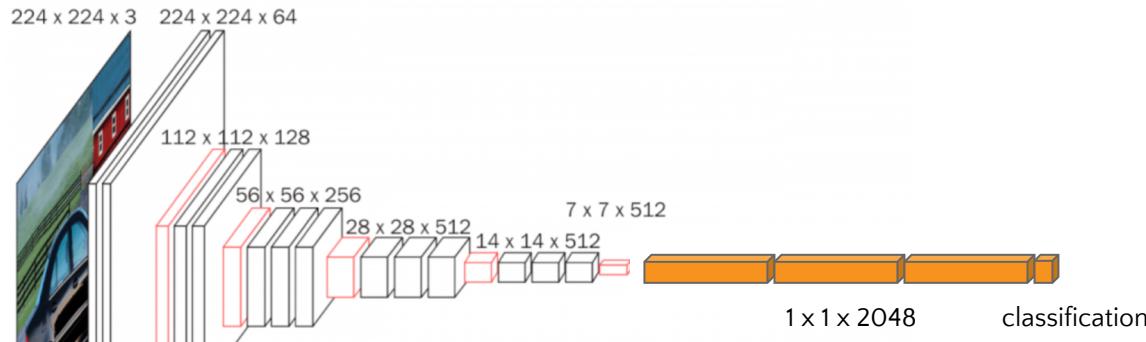
Tuning the VGG-16 Model



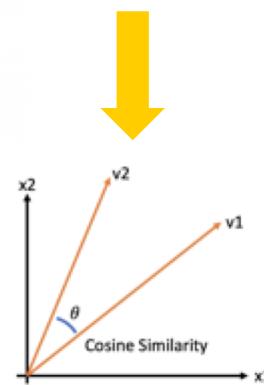
- Pre-trained on ImageNet
- Added four trained layers
- Perform image augmentation
- Randomized 80/20 train-test split
- Tried different learning rates & dropout layers

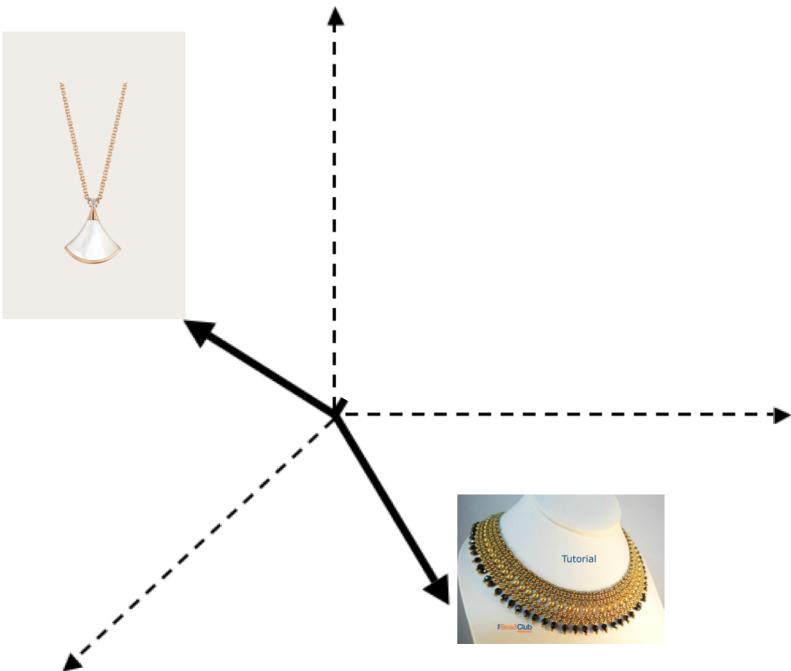


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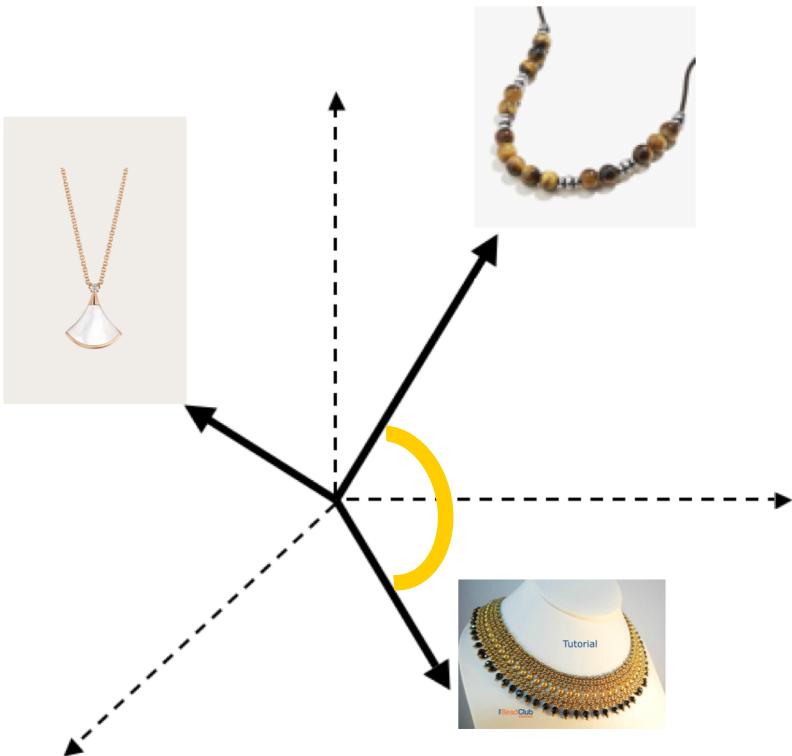
Feature vectors produced by the image classifier contain visual information about the necklaces.





Feature vectors produced by the image classifier contain visual information about the necklaces.





Feature vectors produced by the image classifier contain visual information about the necklaces.





Neck-Less Searching may be faster than Etsy, but is it better?



Which of the two necklaces below is most similar to this necklace?



Option 1



Option 2



Neck-Less Searching may be faster than Etsy, but is it better?

Necklace returned by Etsy with query “gold monogram necklace”



Which of the two necklaces below is most similar to this necklace?



Option 1



Option 2

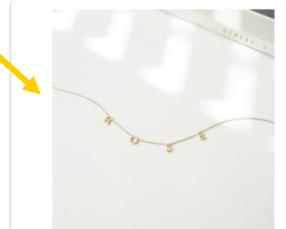


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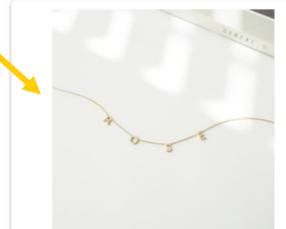


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Users were 4x more likely to choose necklaces returned by my webapp.

Necklace returned by Neck-Less Searching



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Neck-Less Searching

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BeadedNecklaces



BeadedNecklaces



14