

A photograph of a young woman with dark, curly hair, seen from the side and back. She is wearing a simple white t-shirt and blue jeans. Her left arm is raised, with her hand resting against her head. She is looking over her shoulder towards the right side of the frame, where a large, bold title is displayed.

# Optimizing online advertisements with convolutional neural networks

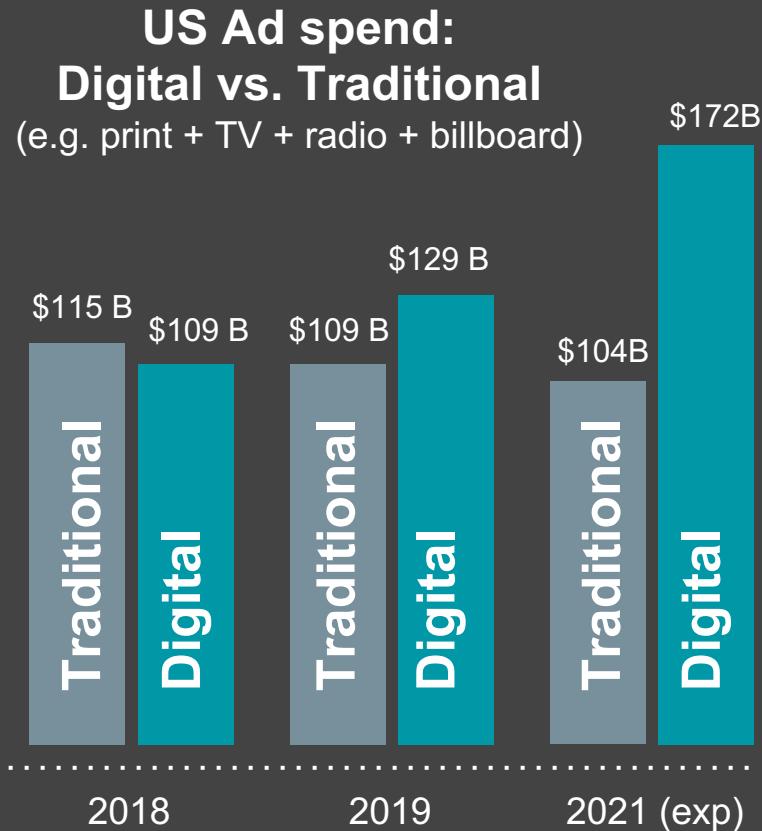
# Why is it important:

**\$280  
Billion**

Global online advertising  
spend estimated in 2020

**\$4.5  
Billion**

Online advertising spend of Booking Holdings (with Priceline offices in NYC) in 2019 alone.



\*Per eMarketer research



# This \$39 Breezy Linen Skirt Is Exactly What Your Summer Wardrobe Needs Right Now

It's from Walmart's trendy fashion line, Scoop

By [Alex Warner](#) | May 14, 2020 02:52 PM

*Each product we feature has been independently selected and reviewed by our editorial team. If you make a purchase using the links included, we may earn commission.*



With summer practically in full swing, we can't help but dream of warmer weather. And even though the season is going to look a little different this year, that doesn't mean we have to sacrifice style. We're convinced a fun and



Sometimes,  
online ads  
aren't perfect...

Lawn mowers?

Weed killer?

Targeted ads  
historically have  
higher  
conversion rates



## Project Overview

**Objective:** create a better ad recommender that matches page content

**Business case:** *increase profits by reducing user cost of acquisition*

# Data:

>35,000

Photos scraped

## Categories:

- Dresses
- Tops
- Denim
- Skirts
- Shorts

## Tools:



### SHOW ME

Cash Back

All / Women / Clothing / Dresses

Bridal Dresses 1.4K  
Cocktail Dresses 13.9K  
Day Dresses 47.0K  
Evening Dresses 22.7K

### SIZE

Regular

XXS (0) 38.3K  
 XS (2) 84.5K  
 S (4-6) 168.6K  
 M (8-10) 116.4K  
 L (12-14) 72.6K

### PRICE & DEALS

\$  Min  to  Max

On Sale

New To Sale

Coupon Code

Over 50% Off

### Dresses

Favorite

Condition: New & Pre-owned

Sort By: Relevance

Showing 10,000+ Dresses

[View Related Searches](#)

Up to 50% Off



Superdown Stassie Sheer Mi...  
~~\$13~~ \$64



Marchesa Illusion V-Neck 3...  
~~\$3,148~~ \$6,995



Tuckernuck Raspberry Jacq...  
~~\$75~~ \$298



Marchesa Embroidered Tru...  
~~\$299~~ \$995



STAUD Sofia Dress In Butter...  
~~\$143~~ \$285



Johnny Was Majorca Embro...  
~~\$114.57~~ \$285



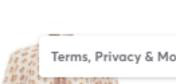
Zimmermann Kirra Shirred T...  
~~\$115~~ \$190



L'Academie Tuscy Dress  
~~\$68~~ \$198

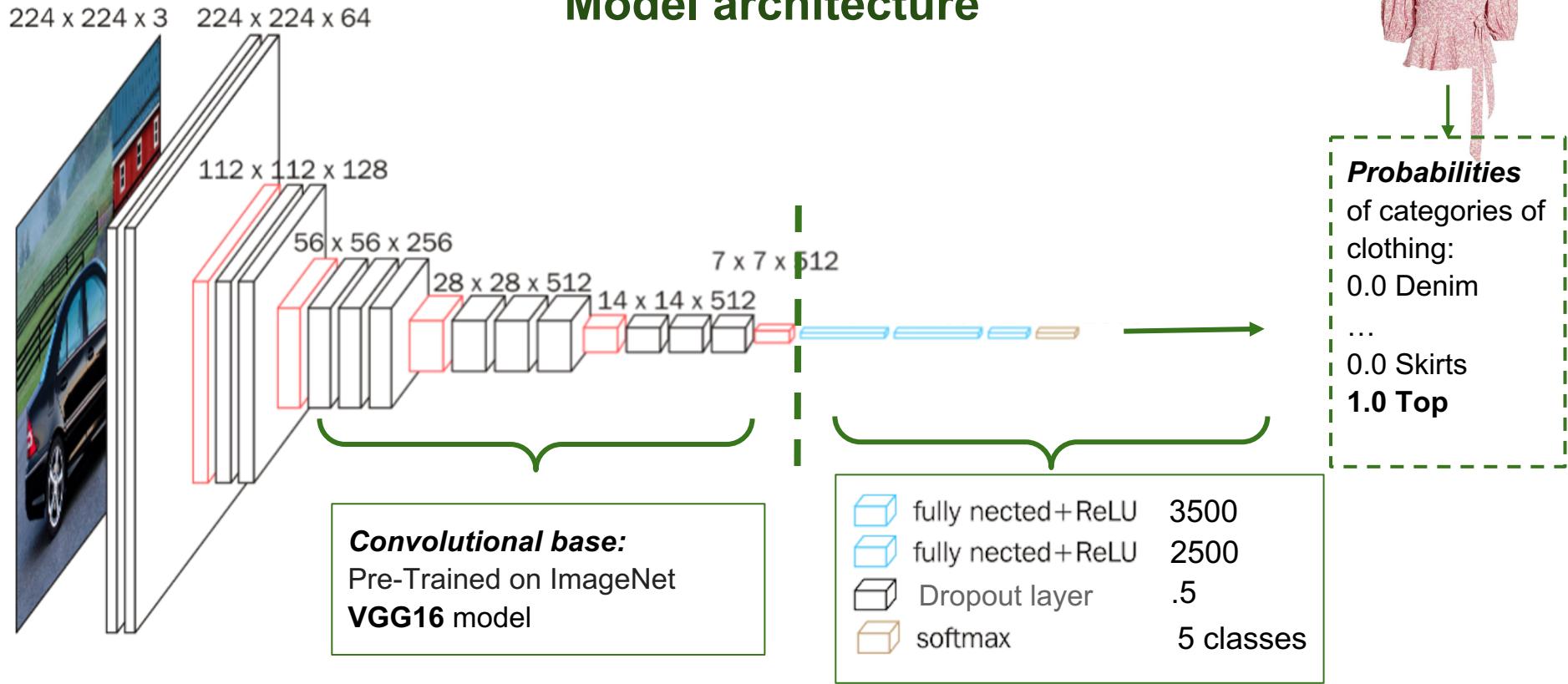


Up to 60% Off

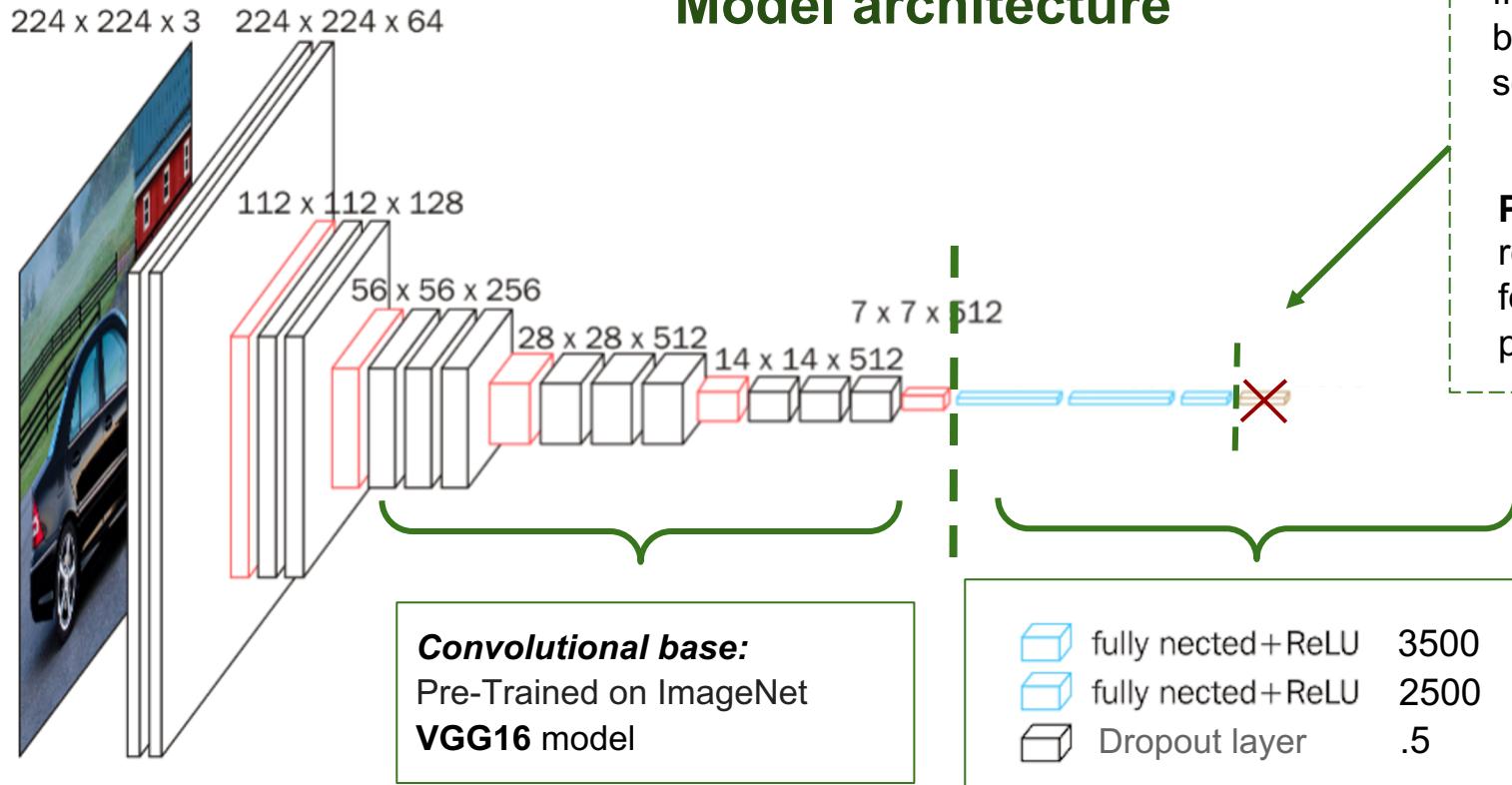


[Terms, Privacy & More](#)

# Model architecture



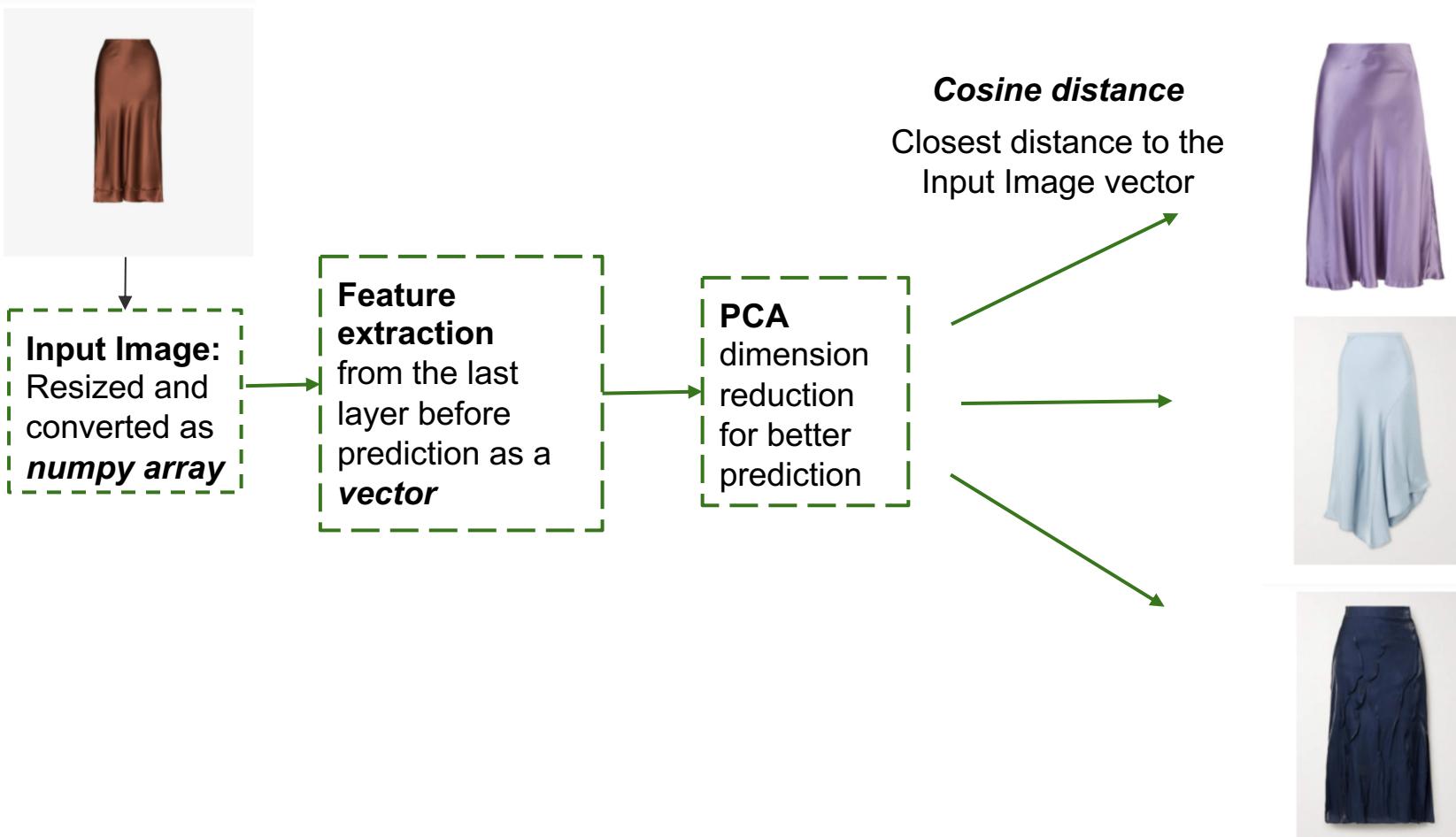
# Model architecture



**Convolutional base:**  
Pre-Trained on ImageNet  
**VGG16** model

	fully connected + ReLU	3500
	fully connected + ReLU	2500
	Dropout layer	.5

# Workflow of the recommendation system



# Recommendation system results:

Alternative 1



Alternative 2



Alternative 3



Alternative 4



Input photo from  
the article:



this opportunity to stock up a fresh batch of [comfy essentials](#), we're choosing to upgrade our at-home wardrobe with the feel-good, summer-ready pieces we've been eyeing since February. From the [Rumi dress](#) both [EmRata](#) and [Kendall Jenner](#) own, to the [Nisa bodysuit](#) spotted on [Kaia Gerber](#) and [Taylor Swift](#), here are the 11 of the best Reformation sale items to add to cart before they're gone.

*All products featured on Glamour are independently selected by our editors. However, when you buy something through our retail links, we may earn an affiliate commission.*



WATCH

Organize Your Beauty Products With Tidy Tova's Simple Tips

Choose your style with Shopstyle:



# Conclusions:

- I built a convolutional neural network model that can classify pieces of clothing by category
- Built a recommendation system using feature extraction from this model
- Algorithm of this model can be applied for better ad recommendations on websites that will be beneficial for brands and ad agencies



THANK YOU

## Training and Validation accuracy scores

