

# ScentMate

## Fragrance Recommendation Systems

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Kelly Peng

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# Motivation

How to choose amongst 20,000 perfumes?

ScentMate, find your perfect match.



# What do I want to do



## NEW USERS

### CONSUMER GROUPS

Don't know what to wear



## INTERMEDIATE USERS

Look for perfumes similar  
with what they liked before



## PERFUME LOVERS

Rated more than 3 perfumes  
on our website

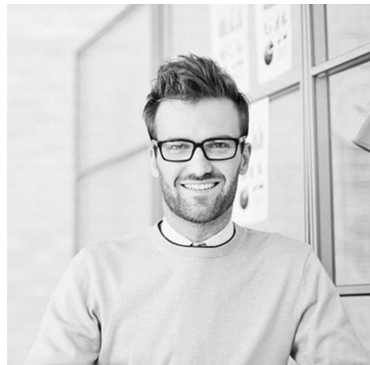
# What do I want to do



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### HOW TO SERVE THEM

Recommend based on quiz results

Recommend similar products

Recommend based on rating history

**Model 1: Content-Based Model**

**Model 2: Collaborative Filtering**

# How to get there



Store scraped data in MongoDB  
on AWS EC2 instance



Flask



Bootstrap

Develop a web app using  
Flask, Bootstrap, HTML, CSS

Parallel scrape data from website  
using 6 AWS EC2 instances



Data analysis, feature  
engineering, modeling,  
cross validation



# The Data

## Perfume Data

- Number of Perfumes: 20k
  - Brand: 1,824
  - Gender: 3
  - Note: 653
  - Theme: 30

## User Rating Data

- Number of Ratings: 40k
  - Perfume ID
  - User ID
  - Rating Score: Range 2 - 10
  - User Comment

# Model 1: Content-Based Recommender

Apply NMF and LDA to  
user comments, choose 12  
topics generated by LDA



# Model 1: Content-Based Recommender

## 12 Latent Topics found by LDA (Latent Dirichlet Allocation)

Apply NMF and LDA to  
user comments, choose 12  
topics generated by LDA



1. sweet, vanilla, apricot, chocolate, patchouli
2. gourmand, sweet, warm, heavy, winter
3. fig, fresh, green, plants, summer
4. gentle, elegant, mature, sexy, feminine
5. fresh, bergamot, citrus, neroli, amber
6. white flowers, fresh, quiet, soft, tea
7. young, fruity, sweet, lovely, lively
8. fresh, clean, summer, cool, cozy
9. rose, gentle, young, peony, feminine
10. spicy, warm, masculine, gentle, mature
11. oriental, mysterious, spicy, deep, dark
12. classic, chanel, dior, luxury, street



# Model 1: Content-Based Recommender

Apply NMF and LDA to  
user comments, choose 12  
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Combine LDA keywords  
with other perfume features,  
build perfume matrix

# Model 1: Content-Based Recommender

Apply NMF and LDA to  
user comments, choose 12  
topics generated by LDA

Build content-based similarity  
model based on Jaccard similarity



Combine LDA keywords  
with other perfume features,  
build perfume matrix

# Model 2: Collaborative Filtering Recommender

	Base Model	Item-item Similarity	Funk SVD
Methodology	Predict mean for everything	Recommend based on the most similar items found by user ratings	Decompose utility matrix into two matrices with latent factors
Performance on Test Set	RMSE: 2.20	RMSE: 7.32	RMSE: 1.95
Reason		Utility matrix too sparse lead to little information going into each prediction	Should perform better if more data available

# Model 2: Collaborative Filtering Recommender

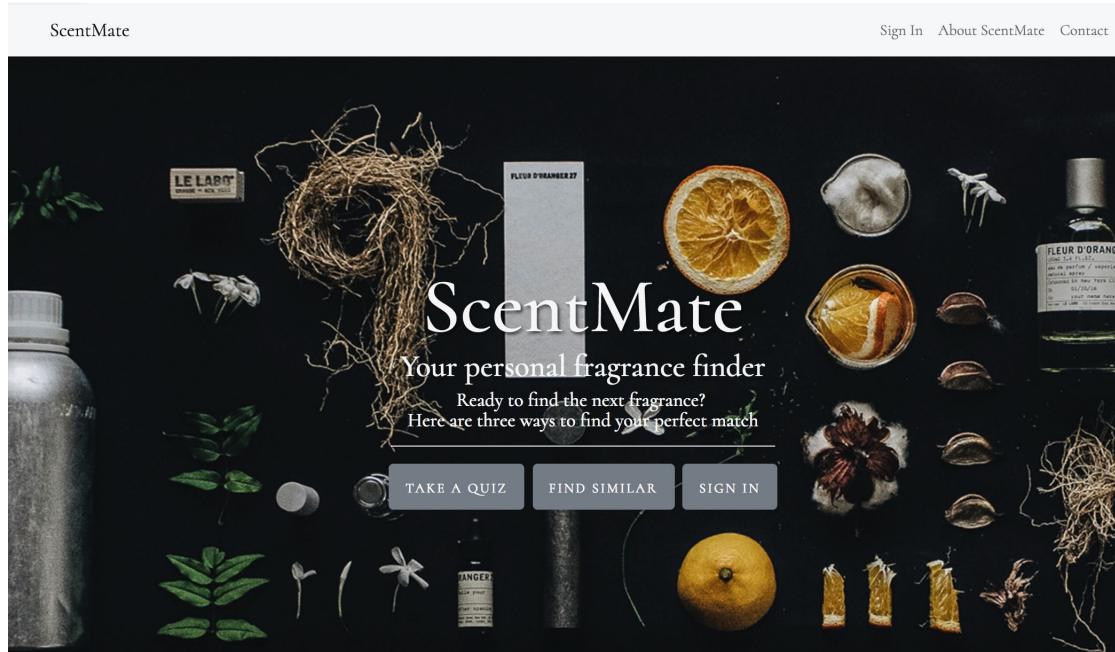
	Base Model	Item-item Similarity	<b>Best!</b> Funk SVD
<b>Methodology</b>	Predict mean for everything	Recommend based on the most similar items found by user ratings	Decompose utility matrix into two matrices with latent factors
<b>Performance on Test Set</b>	RMSE: 2.20	RMSE: 7.32	RMSE: 1.95
<b>Reason</b>		Utility matrix too sparse lead to little information going into each prediction	Should perform better if more data available

**Final model:**

14 latent factors

Added regularization

# Final Product: Web App



**NEW USERS**

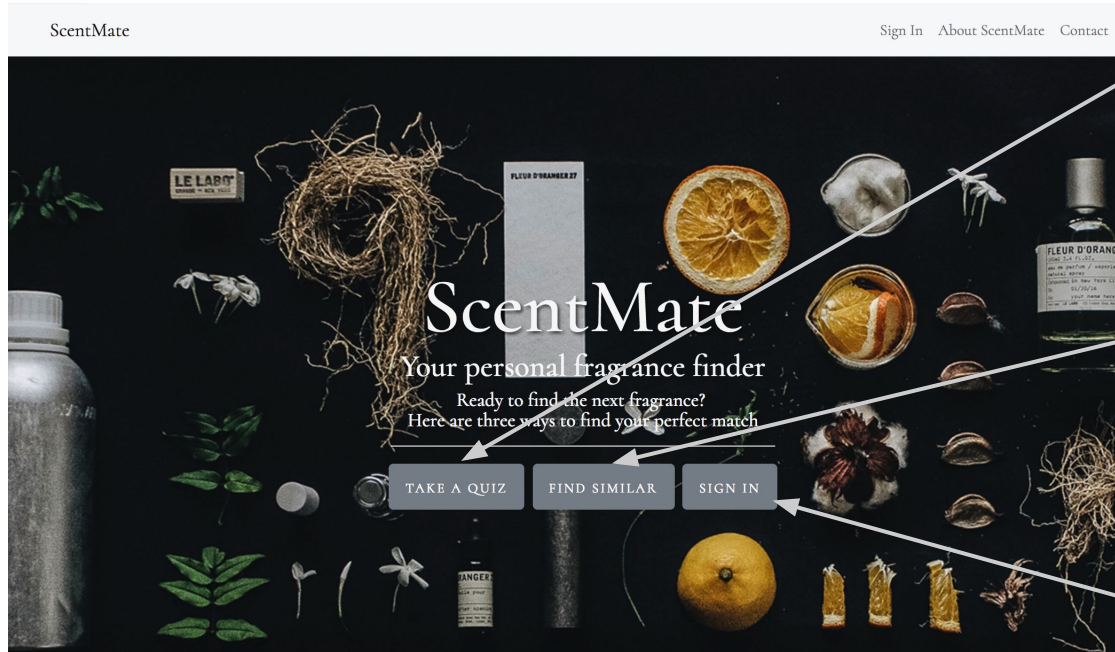


**INTERMEDIATE USERS**



**PERFUME LOVERS**

# Final Product: Web App



**NEW USERS**



**INTERMEDIATE USERS**



**PERFUME LOVERS**

# Final Product: Web App



## NEW USERS

Recommend based on quiz answers

ScentMate Sign In About ScentMate Contact

Tell me something about you...

Your gender ☐ Female ☐ Male

How do you want to feel when wearing perfumes?

- ☐ Sweet
- ☐ Gentle
- ☐ Elegant
- ☐ Mature
- ☐ Sexy
- ☐ Feminine
- ☐ Fresh
- ☐ Classy
- ☐ Soft
- ☐ Easygoing
- ☐ The girl next door
- ☐ Young lady
- ☐ Lovely
- ☐ Lively

# Final Product: Web App



## NEW USERS

Recommend based on quiz answers

ScentMate

Your gender ☒ Female ☐ Male

How do you want to feel when wearing:

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ScentMate

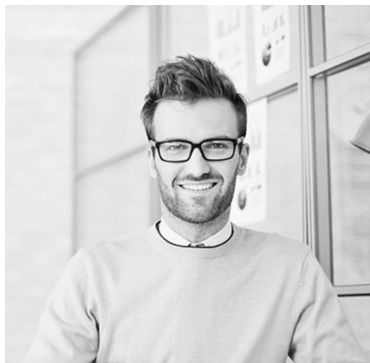
Based on what you like, we found 5 perfumes match you the best:

Brand	Perfume Name	Gender	Theme	Notes
Hermes	爱马仕 橘绿之泉 Hermes Eau D'Orange Verte, 1979	Unisex	Floral Green	orange b
Kaloo	卡露儿 蓝熊宝宝 Kaloo Blue, 2001	Unisex	Floral	bergamo
Roger & Gallet	香邂格蕾 上善之水 Roger & Gallet Jean-Marie Farina Eau des Bienfaits	Female	Floral Fruity	blood on
Courreges	活希源 天空之水 Courreges La Fille de l'Air Eau d'Ete, 2016	Female	Floral	bergamo
Guerlain	娇兰 花草水语 - 初夏沁梨 (夏日梨沙冰) Guerlain Aqua Allegoria Pera Granita, 2016	Female	Floral Fruity	grapefru musk, co
Kenzo	高田贤三 玫瑰黄 Kenzo Couleur Kenzo Jaune-Yellow, 2012	Female	Floral	bergamo

\*Result table has Chinese text because data is scraped from Chinese fragrance website



# Final Product: Web App



## INTERMEDIATE USERS

Recommend based on content similarity

ScentMate					Sign In
I see, you like 迪奥 真我 Dior J'adore, 1999.					
This is a Floral Fruity Female fragrance of Dior.					
The key features of this fragrance are: magnolia, melon, peaches, pear, bergamot, oranges, late incense jade, plums, violet, orchids, freesia, jasmine, lily of the valley, rose, musk, v					
When you are wearing this perfume, people will think of you as ...(need further NLP work)					
And because you like 迪奥 真我 Dior J'adore, 1999, we found some perfumes you will also like:					
Brand	Perfume Name	Gender	Theme	Note	
Lanvin	浪凡 我愿意 (嫁给我) Lanvin Marry Me, 2010	Female	Floral Fruity	bitter orange, freesia, peaches, jasmine, rose, magnolia, musk, cedar, amber	
Laura Biagiotti	罗娜 同名女士香水 Laura Biagiotti Laura, 1994	Female	Floral	lychee, plums, green leaves, peaches, bergamot, watermelon, Brazilian mahogany, c the valley, rose, sandalwood, amber, musk, vanilla, vetiver grass, cedar	
YSL Yves Saint Laurent	圣罗兰 唯爱 (反之亦然) YSL Yves Saint Laurent Vice Versa, 1999	Female	Floral Fruity	oranges, raspberry, blueberries, tomato, jasmine, orange blossom, late incense jade, iris, cedar, amber, vanilla	
Ted Lapidus	泰德拉皮迪斯 幻想 Ted Lapidus Fantasme, 1992	Female	Floral Fruity	pineapple, green leaves, violet, peaches, bergamot, rose, raspberry, iris root, jasm	
Clinique	倩碧 快乐 Clinique Happy, 1998	Female	Floral Fruity	oranges, oranges, plums, grapefruit, apple, bergamot, orchids, freesia, lily of the val	

# Final Product: Web App



## PERFUME LOVERS

Recommend based on rating  
history

ScentMate	Sign In	About ScentM
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Based on what you like, we found 5 perfumes match you the best:

Brand	Perfume Name	Gender	Theme	Notes
Hermes	爱马仕 橘绿之泉 Hermes Eau D'Orange Verte, 1979	Unisex	Floral Green	orange blossom, oranges, jasmine, bergamot, lemon
Kaloo	卡露儿 蓝熊宝宝 Kaloo Blue, 2001	Unisex	Floral	bergamot, oranges, orange blossom, honeysuckle, musk
Roger & Gallet	香邂格蕾 上善之水 Roger & Gallet Jean-Marie Farina Eau des Bienfaits	Female	Floral Fruity	blood orange, oranges, bergamot, lemon, violet leaves, o
Courreges	活希源 天空之水 Courreges La Fille de l'Air Eau d'Ete, 2016	Female	Floral	bergamot, ozone, orange blossom, musk, cedar
Guerlain	娇兰 花草水语 - 初夏沁梨 (夏日梨沙冰) Guerlain Aqua Allegoria Pera Granita, 2016	Female	Floral Fruity	grapefruit, bergamot, lemon, orange blossom, osmanthu musk, cedar
Kenzo	高田贤三 玫瑰黄 Kenzo Couleur Kenzo Jaune-Yellow, 2012	Female	Floral	bergamot, lemon, jasmine, orange blossom, vanilla, mus

# Future Work

1. Improve content-based recommender
  - a. Price information not available, big drawback on model performance
  - b. Word2Vec: combine multiple perfumes together to find a similar one
2. Build an automatic data processing pipeline
  - a. Make sure data is not outdated

# Thank you

Kelly Peng

[kellypeng17@gmail.com](mailto:kellypeng17@gmail.com)

[github.com/kellypeng](https://github.com/kellypeng)

[linkedin.com/in/pengyuwei](https://linkedin.com/in/pengyuwei)



# Appendix I

## Issues with data:

**60%** users rated  $< 3$  perfumes

- Problem: Cannot cross-validate prediction
- Solution: Removed users with  $< 3$  ratings

