



# TA'AM

Graduation Project Presentation

# Team

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# Supervisors

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- TA. Ahmed Hatem

# Agenda



# Agenda

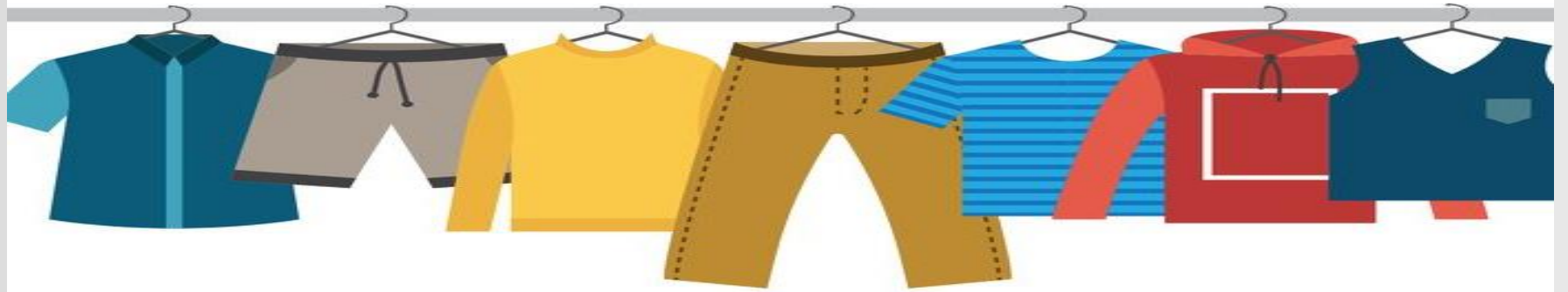
1. Introduction
2. Motivation
3. Objectives
4. Challenges
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7. Applications
8. System Architecture
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# Introduction



# Introduction



The clothing industry ranks **fourth** in environmental impact, responsible for **10%** of global carbon emissions and **20%** of wastewater. To address this, extending the lifespan of clothes and choosing second-hand over new ones can significantly reduce the industry's carbon footprint and wastewater contributions.



# Motivation





# Motivation

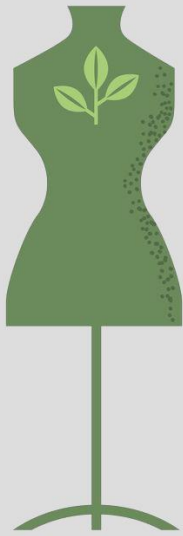
- Playing a role in resolving the environmental problem mentioned before.
- Giving a chance to users to profit from their surplus clothes.
- Helping users buy clothes at a lower cost than the original ones.
- Users can choose to donate unused clothes to other people who need them.





# Objectives





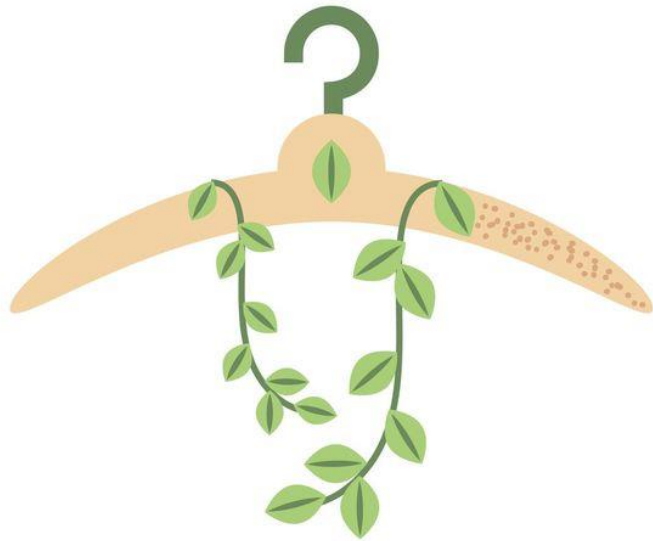
# Objectives

- Offer a specialized platform for users to allow them to showcase their surplus clothing, and buy suitable ones at a relatively low cost.
- Enhance the user experience by implementing multiple machine learning models to assess image suitability, extract various attributes, and offer diverse search capabilities.

# Challenges



# Challenges



- Image capturing constraints
- Automated attributes extraction
- Security for our application and machine learning models

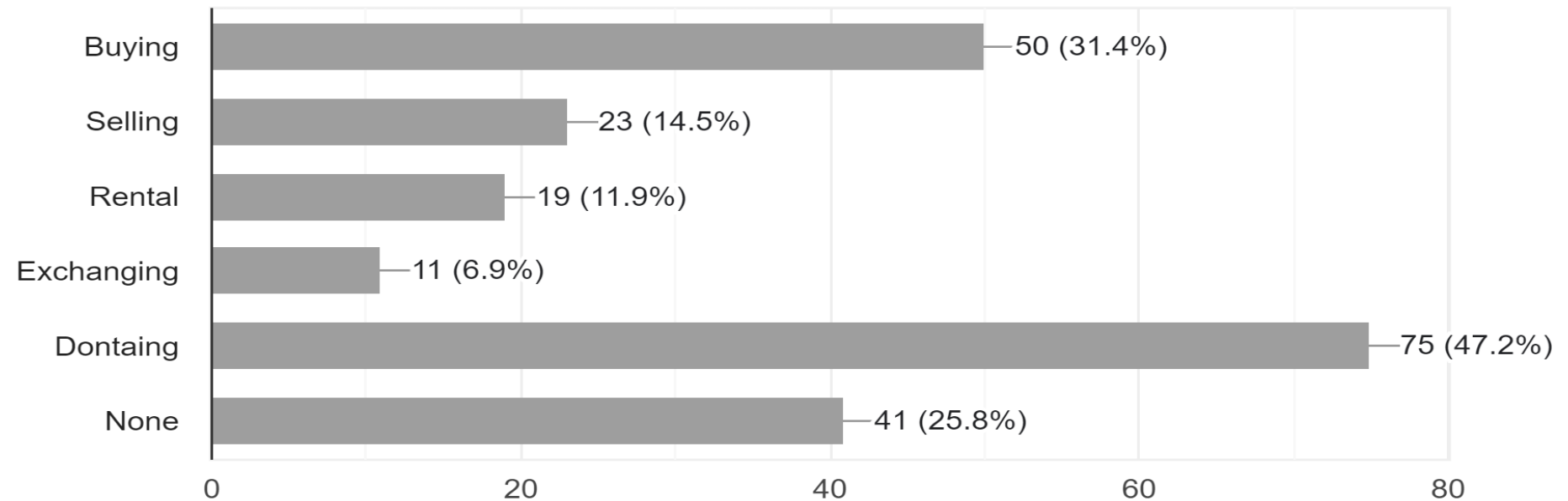
# Survey Observations



# Survey Observations

Do you perform any of these operations related to used clothes: "هل تقوم بأي من هذه العمليات المتعلقة بالملابس المستعملة؟"

159 responses

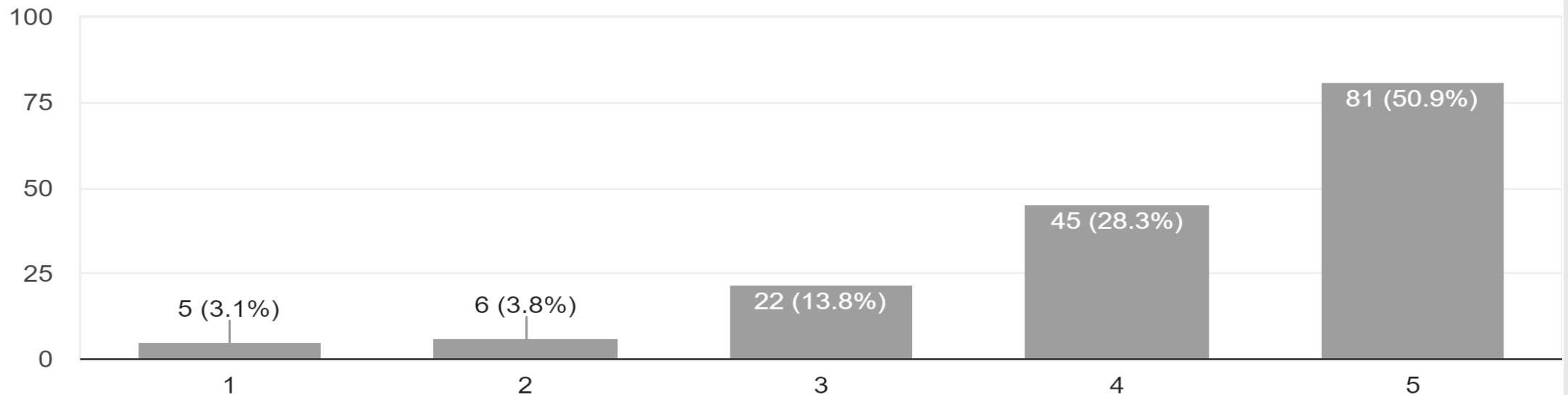




# Survey Observations (cont.)

On a scale from 1 to 5, how bothered are you by bad-quality images when you purchase an online product? "على مقياس من 1 إلى 5، مدى انزعاجك من جودة الصور السيئة عند شراء منتج عبر الإنترنت؟"

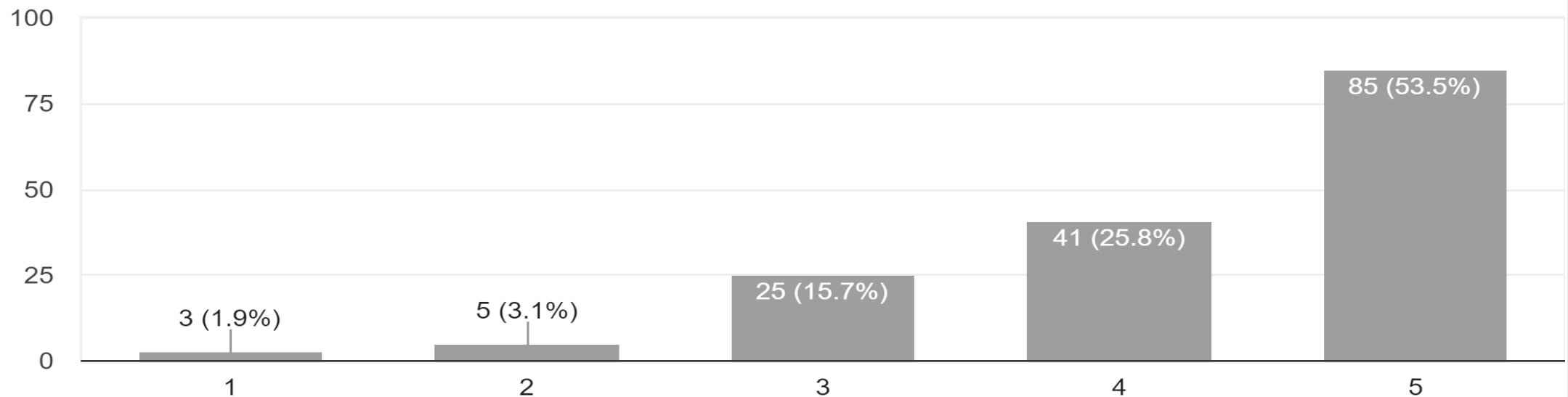
159 responses



# Survey Observations (cont.)

On a scale from 1 to 5, how bothered are you by the lack of information about the product when you purchase an online product? "لى مقياس من 1 إلى 5، مدى انزع... عدم وجود معلومات كافية عن المنتج عند شرائه عبر الإنترنت؟"

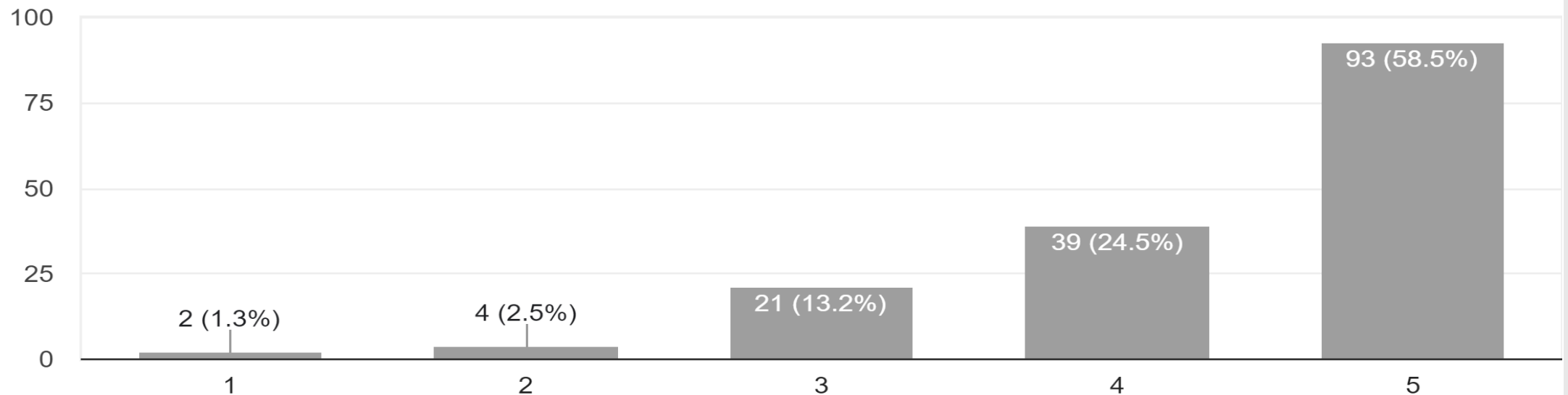
159 responses



# Survey Observations (cont.)

Can you rate on a scale of 1 to 5 how useful it would be for you to have a feature that allows you to search for the nearest products to a specific item you ne...؟  
"العنصر المحدد الذي تحتاجه استنادًا إلى صورة أو وصف؟"

159 responses



# Related Work



# Related Work (Segmentation)

Paper	Methods	Measuring Criteria	Dataset	Limitations
[1] An Intelligent Solution for Automatic Garment Measurement Using Image Recognition Technologies	<ul style="list-style-type: none"> <li>UNet Model</li> <li>UNet(DeepFashion2)</li> <li>UNet(Carvana)</li> <li>UNet 128 * 128</li> <li>UNet 256 * 256</li> <li>UNet 512 * 512</li> </ul>	Max Dice: Regular Images:    Augmented Images: <ul style="list-style-type: none"> <li>0.919                      0.918</li> <li>0.825                      0.906</li> <li>0.879                      0.891</li> <li>0.943                      0.979</li> <li>0.922                      0.976</li> <li>0.906                      0.971</li> </ul>	Original Dataset: <ul style="list-style-type: none"> <li>683 Images of clothing with various challenges</li> </ul> DeepFashion2 Dataset.	<ul style="list-style-type: none"> <li>Dataset Imperfections</li> <li>Algorithm Complexity</li> </ul>
[2] Semantic Image Segmentation on Clothing Imagery with Deep Neural Networks (2020)	<ul style="list-style-type: none"> <li>DeepLabv3+</li> <li>GSCNN</li> </ul>	Regular Images: <ul style="list-style-type: none"> <li>91.81% (DeepLabv3+)</li> <li>88.97% (GSCNN)</li> </ul> Augmented Images: <ul style="list-style-type: none"> <li>89.28% (DeepLabv3+)</li> <li>88.34% (GSCNN)</li> </ul>	Training Datasets: <ul style="list-style-type: none"> <li>Sellpy dataset for regular and augmented dataset</li> </ul> Test Datasets: <ul style="list-style-type: none"> <li>Four distinct datasets for evaluation</li> </ul>	<ul style="list-style-type: none"> <li>Dataset Imperfections</li> </ul>

# Related Work (Classification)

Paper	Methods	Measuring Criteria	Dataset
[3] Apparel classification with style (2012).	<ul style="list-style-type: none"> <li>One vs all SVM</li> <li>Random forest</li> <li>Transfer forest</li> </ul>	<ul style="list-style-type: none"> <li>35.03%</li> <li>38.29%</li> <li>41.36%</li> </ul>	<ul style="list-style-type: none"> <li>Apparel Classification with Style</li> </ul>
[4] Convolutional Neural Networks for Fashion Classification and Object Detection (2015).	<ul style="list-style-type: none"> <li>AlexNet</li> </ul>	<ul style="list-style-type: none"> <li>50.2%</li> </ul>	<ul style="list-style-type: none"> <li>Apparel Classification with Style</li> </ul>
[5] A CNN Based Approach for Garments Texture Design Classification (2017).	<ul style="list-style-type: none"> <li>Hog</li> <li>AlexNet</li> <li>Proposed model based-on AlexNet</li> </ul>	<ul style="list-style-type: none"> <li>63.76% (CAD)</li> <li>79.15% (Fashion Dataset)</li> <li>75.6% (CAD),</li> <li>81.8% (Fashion Dataset)</li> <li>77.8% (CAD),</li> <li>84.5% (Fashion Dataset)</li> </ul>	<ul style="list-style-type: none"> <li>Clothing Attribute Dataset</li> <li>Fashion Dataset</li> </ul>
[6] DeepFashion: Powering Robust Clothes Recognition and Retrieval with Rich Annotations (2016).	<ul style="list-style-type: none"> <li>FashionNet(VGG16 architecture backbone)</li> </ul>	<ul style="list-style-type: none"> <li>Top-3 82.58%</li> <li>Top-5 90.17%</li> </ul>	<ul style="list-style-type: none"> <li>DeepFashion</li> </ul>
[7] Clothes Classification with the DeepFashion Dataset and Fastai (2021).	<ul style="list-style-type: none"> <li>ResNet34</li> </ul>	<ul style="list-style-type: none"> <li>Top-3 88.6%</li> <li>Top-5 94.1%</li> <li>Top-1(user-specified data) 62.4%</li> </ul>	<ul style="list-style-type: none"> <li>DeepFashion</li> </ul>



# Related Work (Searching)

Paper	Methods	Measuring Criteria	Dataset
[8] Image Search With Text Feedback by Visiolinguistic Attention Learning	<ul style="list-style-type: none"> <li>FilM</li> <li>MRN</li> <li>TIRG</li> <li>VAL (Lv<sub>v</sub>)</li> <li>VAL (Lv<sub>v</sub>+Lv<sub>s</sub>)</li> <li>VAL (GloVe)</li> </ul>	R@50: <ul style="list-style-type: none"> <li>68.30</li> <li>67.01</li> <li>69.39</li> <li>73.53</li> <li>73.91</li> <li>75.83</li> </ul>	<ul style="list-style-type: none"> <li>FashionIQ</li> <li>Fashion200k</li> <li>Shoes</li> </ul>
[9] Image Search with Text Feedback by Additive Attention Compositional Learning	<ul style="list-style-type: none"> <li>TIRG</li> <li>MAAF</li> <li>RTIC</li> <li>AACL</li> </ul>	R@50: <ul style="list-style-type: none"> <li>75.60±0.09</li> <li>77.51±0.63</li> <li>75.54±1.63</li> <li>78.86±0.43</li> </ul>	<ul style="list-style-type: none"> <li>Fashion200k</li> <li>Shopping100k</li> <li>FashionIQ</li> </ul>

# Applications



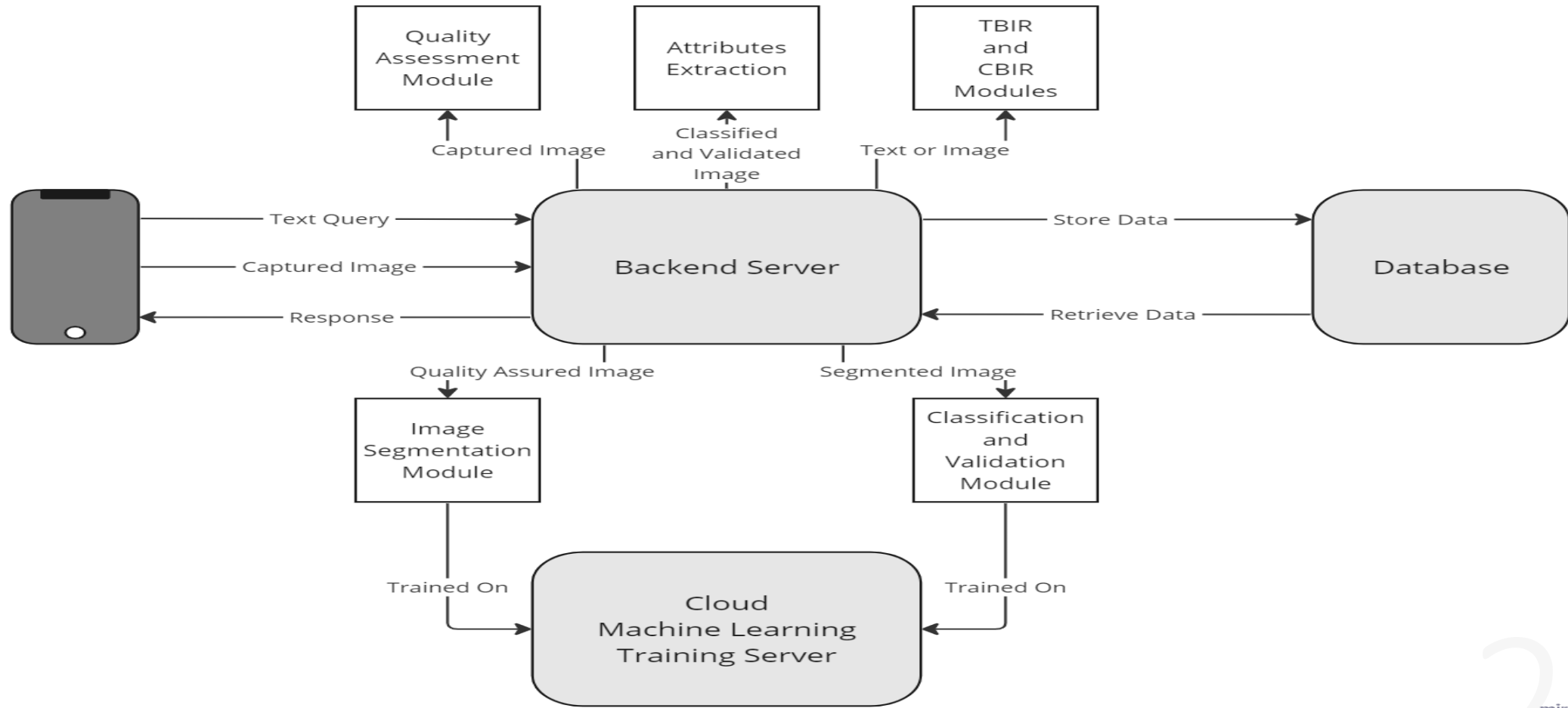
# Feature Comparison

Feature	Facebook Marketplace	OLX	TA'AM
Communication	✓	✓	✓
Image assessment			✓
Search by Image			✓
Search by description	✓	✓	✓
Feature extraction			✓
Face-to-Face exchanges	✓	✓	✓
Rating	✓	✓	✓

# System Architecture



# System Architecture



# Phases Description





# Phases Description

**Image Assessment:** This phase is divided into two parts firstly, it ensures that the quality of the image is good enough. Secondly, Ensure that the image contains a clothing item, as the application is only for clothes. And both are for our processing efficiency and the user experience.

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# Phases Description(cont.)

**Segmentation & Classification:** Classifying and segmenting the image for any further processing as attributes extraction model or searching by image model.

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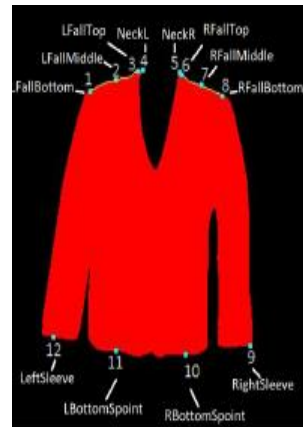


Blazer

# Phases Description(cont.)

**Size Estimation:** Estimating the dimensions of a garment involves a two-step process after segmenting and classifying the First, detecting the key points. Then, real-world values are assigned to the pixels through the use of a reference object.

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# Phases Description(cont.)

**Attributes Extraction:** In this phase, we extract different attributes from the image such as category, size, color, (season, gender, description, ...) according to the data

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T-shirt

Black

Male

Summer

56 \* 77

# Phases Description(cont.)

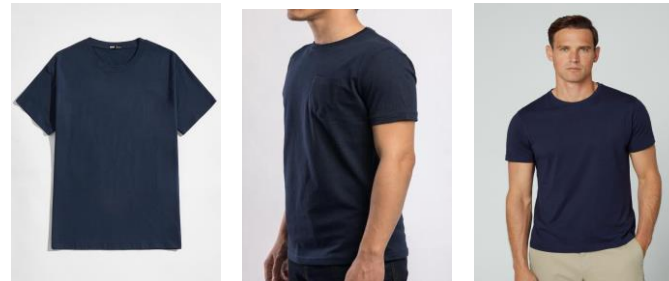
**Search Capabilities:** The phase we provide the user to search for a specific item using an image or a brief description to find the closest items.

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Search by images:

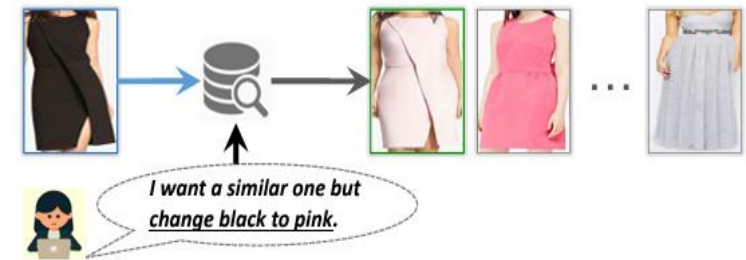


Search by text:



I need a basic navy t-shirt with a round neck

Search by Image and text:



# Data Sets







# Datasets

## [DeepFashion2](#)

DeepFashion2 is a large-scale dataset designed for advancing computer vision research in fashion-related tasks. With over 800,000 images spanning diverse clothing categories, backgrounds, and poses.

## [Fashion Product Images Dataset](#)

Fashion product images dataset is a 25GB high-resolution product image with 11 attributes (id, gender, masterCategory, subcategory, articleType, baseColor, season, year, usage, productDisplayName).



# Datasets (cont.)

## Clothing dataset (full, high resolution)

5,000 images of 20 different classes of clothes images taken by users.

## Fashion MNIST

Fashion-MNIST is a dataset of Zalando's article images—consisting of a training set of 60,000 examples and a test set of 10,000 examples. Each example is a 28x28 grayscale image, associated with a label from 10 classes.

# Tools & Languages



# Tools and Languages



Python



Flutter



Google Colab



Tensor Flow

# Time Plan



# Time Plan

■ Finished
 ■ In Progress
 ■ To Do

	1-Oct	1-Nov	1-Dec	1-Jan	1-Feb	1-Mar	1-Apr	1-May
Survey and related topics	45							
Requirements Specifications		14						
Project Analysis		14						
Project Design		60						
Project Implementation		135						
Project Testing			105					
Project Integration							14	
Project Improvements								14
Project Documentation	200							

# References



# References

1. A. Paulauskaite-Taraseviciene, et al., "An intelligent solution for automatic garment measurement using image recognition technologies," *Applied Sciences*, vol. 12, no. 9, pp. 4470, 2022.
2. H. Alinder, "Semantic Image Segmentation on Clothing Imagery with Deep Neural Networks," 2020.
3. L. Bossard, et al., "Apparel classification with style," in *Computer Vision ACCV 2012*, Springer Berlin Heidelberg, 2013, pp. 321-335.
4. B. Lao and K. A. Jagadeesh, "Convolutional Neural Networks for Fashion Classification and Object Detection," 2015.
5. S. S. Islam, E. K. Dey, M. N. A. Tawhid, and B. M. M. Hossain, "A CNN Based Approach for Garments Texture Design Classification," *Adv. technol. innov.*, vol. 2, no. 4, pp. 119–125, May 2017.
6. Z. Liu, P. Luo, S. Qiu, X. Wang, and X. Tang, "DeepFashion: Powering Robust Clothes Recognition and Retrieval with Rich Annotations," in *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2016.
7. T. Sennikova, "Clothes Classification with the DeepFashion Dataset and Fastai," *towardsdatascience*, Available: <https://towardsdatascience.com/clothes-classification-with-the-deepfashion-dataset-and-fast-ai-1e174cbf0cdc>, Accessed: 19/11/2023.
8. Y. Chen, S. Gong, and L. Bazzani, "Image search with text feedback by visiolinguistic attention learning," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2020.
9. Y. Tian, S. Newsam, and K. Boakye, "Image search with text feedback by additive attention compositional learning," *arXiv preprint arXiv:2203.03809*, 2022.



# Thank You

Any Questions?



# TA'AM

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