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S H A P I N G   I N D I A ' S   T E C H S C A P E

# Software Development Track



**Problem Statement Title:** AI-Powered Size Chart Generator for Apparel Sellers.

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Team Name	Dhuwaliaofficial	
Team ID	UA8S3Y54	
Institute Name/Names	Jaypee Institute of Information Technology (JIIT), Noida	
Team Members	1	2
Name	Anmol Dhuwalia	Harsh Kumawat
Batch (Passing Year)	2026	2026

**GITHUB REPOSITORY:** <https://github.com/harshk04/Flipkart-Grid-6.0/blob/main/Size%20Chart%20Generator.ipynb>

# AI-Driven User Size Prediction and Gender Specific Size Chart Generator for Apparel Sellers

## Problem & Proposed Solution:

Apparel sellers struggle with generating accurate size charts due to limited or inaccurate data, leading to high return rates and customer dissatisfaction.

## Model Utilization

- Uses **user body measurements** and **purchase/return history**
- Generates **accurate size charts** and **predicts best fit** (S, M, L, XL)

## Clustering

- **Identifies and groups similar body types**
- Matches with **successful purchase patterns**

## Size Chart Generation

- **Creates detailed size charts** for Male and Female (S, M, L, XL, etc.)

## Confidence Scores & Data Updating

- Provides **confidence scores** for each measurement
- **Updates with new purchase and return data**

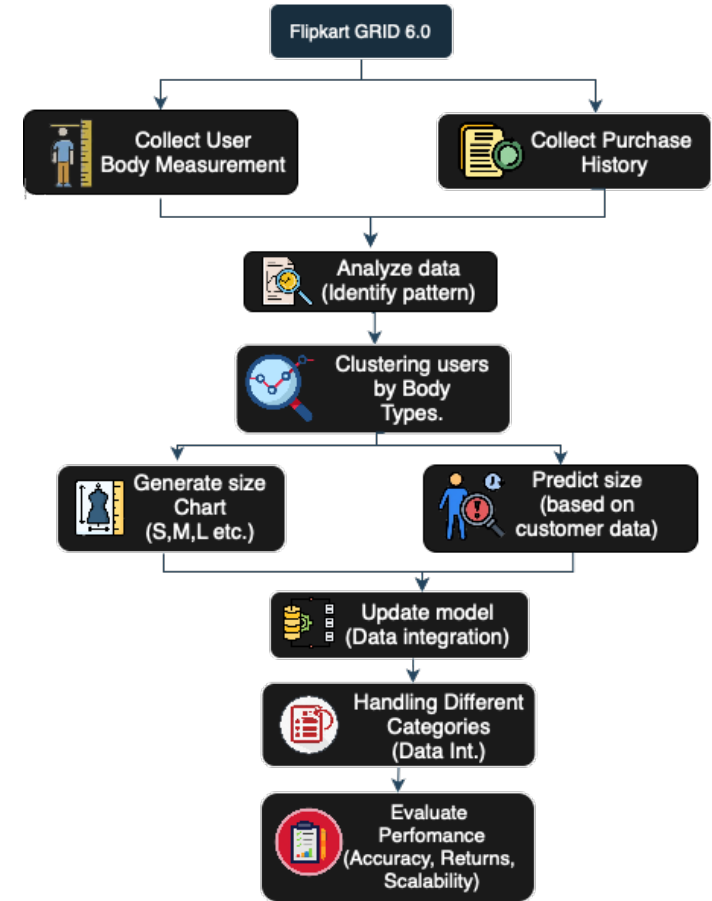


## Objectives and Approach:

- **Generate accurate size charts** to reduce returns and enhance customer satisfaction by analysing user measurements and purchase history.
- **Utilize machine learning** for clustering and predictive modelling, with continuous updates for scalability across apparel categories.

## Impact

- Reduction in Returns
- Enhanced Customer Satisfaction
- Increased Sales
- Streamlined Shopping Experience
- Operational Efficiency



**Fig.1:** Flow Chart

# METHODOLOGY

## Data Preprocessing & Analysis

- **Data Pre-processing:** Convert height/weight, handle missing values, and encode categories.
- **Analysis:** Machine learning models identify patterns, cluster similar body types, and map to sizes.

## Size Chart Generation

- **Generate Size Charts:** AI creates and updates size charts with confidence scores (S, M, L, XL) for Men and Women.

# TOOLS AND TECHNOLOGIES

- **Languages:** Python
- **ML Libraries:** TensorFlow, Keras, Scikit-Learn
- **Visualization:** Matplotlib, Seaborn.

# ALGORITHM

- **Clustering:** K-means for body type grouping.
- **Classification:** Random Forest, Gradient Boosting for size prediction.
- **Confidence Scoring:** Derived from model probabilities to assess size recommendation reliability.



# RESULTS & ANALYSIS

## Men's Size Chart

- **Sizes**
  - **Size L:** Average waist is 27.03, hips 32.13.
  - **Size M:** Waist increases to 24.47, with hips at 24.95.
  - **Size XXL:** Largest measurements with a waist of 32.04 and hips of 37.32.
- **Body Shape Index:**
  - **Size L:** 0.64, indicating a slimmer build.
  - **Size XXL:** 3.12, showing a significantly broader body shape.

## Silhouette Scores

**Men's Chart:** Higher accuracy with a silhouette score of 0.94, reflecting better-defined clusters.

Silhouette Score: 0.9440671945224146

MEN'S SIZE CHART

	Pant Size	Average Waist	Average Hips	Average Body Shape Index
0	L	27.027272727272727	32.127272727272725	0.6363636363636364
1	M	24.473684210526315	28.49473684210526	2.9473684210526314
2	S	38.46153846153846	44.0989010989011	3.021978021978022
3	XL	37.21621621621622	43.24324324324324	0.5045045045045045
4	XXL	32.04237288135593	37.32203389830509	3.1186440677966103

Fig.2: Men's Generated Size Chart

MEN'S LOWER SIZE CHART

	Size	Average Waist	Average Hips	Average Body Shape Index
0	L	27.027272727272727	32.127272727272725	0.6363636363636364
1	M	24.473684210526315	28.49473684210526	2.9473684210526314
2	S	38.46153846153846	44.0989010989011	3.021978021978022
3	XL	37.21621621621622	43.24324324324324	0.5045045045045045
4	XXL	32.04237288135593	37.32203389830509	3.1186440677966103

Fig.3: Size Chart Generated for Different Apparel

# RESULTS & ANALYSIS

## Women's Size Chart

### •Sizes:

- **Size M:** Average bust/chest is 41.0, waist 33.0, hips 42.0.
- **Size L:** Average bust/chest is 39.0, waist 31.0, hips 36.0.
- **Size XL:** Largest size with an average bust/chest of 43.0, waist 35.0, and hips 42.0.

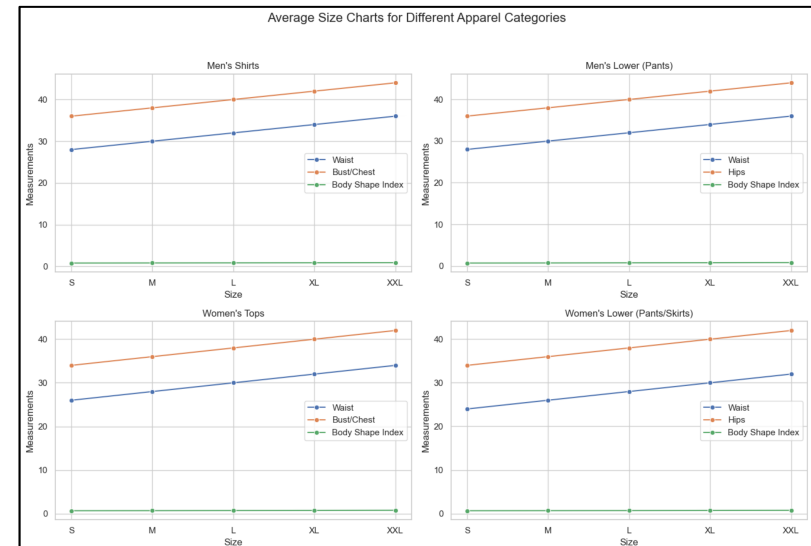
• **Body Shape Index:** Ranges from 0.69 (M) to 0.87 (XXL), indicating the variation in body shapes across different sizes.

## Silhouette Scores

**Women's Chart:** 0.91, showing strong clustering and model accuracy

Silhouette Score: 0.9134632798529108					
WOMENS SIZE CHART					
	Top Size	Average Bust/Chest	Average Waist	Average Hips	Average Body Shape Index
0	L	41.0	33.0	42.0	0.765
1	M	35.0	27.0	36.0	0.69
2	S	39.0	31.0	39.0	0.7849999999999999
3	XL	37.0	29.0	36.0	0.81
4	XXL	43.0	35.0	42.0	0.87

**Fig.4:** Women's Generated Size Chart



**Fig.5:** Average Size Charts for Different Apparel Categories

# CHALLENGES FACED



- **Data Quality:** We introduced guided tools to reduce self-measurement errors, ensuring more consistent user data collection.
- **Handling Diverse Body Types:** Trained the AI model with a diverse dataset of body types and added regional sizing adjustments to improve adaptability.
- **Integration with Existing Systems:** We developed flexible API integration modules and used robust encryption to secure user data, ensuring regulatory compliance.

# LIMITATIONS

- **Scalability and Performance:** Managing large datasets and fast processing as user numbers grow can challenge system performance.
- **Adaptability and Compliance:** Adapting to different brands and regional data privacy regulations may need ongoing adjustments.



# RECOMMENDATIONS AND FUTURE WORK



## ❑ **Enhance Data Collection and Model Accuracy:**

- Implement standardized measurement guidelines and encourage user input verification.
- Expand data sources by integrating customer feedback and collaborating with diverse brands.

## ❑ **Explore Broader Applications and Adaptability:**

- Apply the technology to footwear and accessories and investigate international sizing standards.
- Continuously train the AI model with new data and trends to adapt to changing fashion styles.

## ❑ **Strengthen Data Privacy and User Trust:**

- Adhere to data protection regulations (e.g., GDPR) and implement strong encryption.
- Design an intuitive interface, build trust with transparent AI processes, and address biases in the AI model.

## ❑ **Improve AI Integration and Scalability:**

- Develop robust APIs for seamless e-commerce integration and ensure compatibility with various data structures.
- Invest in scalable infrastructure to handle growing datasets and ensure system performance during peak traffic.

# APPENDICES

## ❑ **Detailed Data:**

- Comprehensive dataset of user body measurements, purchase history, and return/exchange data.

## ❑ **Additional Charts:**

- Visualizations of size recommendation accuracy and return rate improvements.
- Charts comparing initial and post-implementation performance metrics.

## ❑ **Extended Explanations:**

- Technical documentation of AI algorithms and model training processes.

## ❑ **Case Studies:**

- Examples of successful implementation and impact on return rates and customer satisfaction.





***Thank You !***