"Doesn't This Look Familiar?"

A Multimodal Approach to Finding Duplicate Products

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Project Background

macy's has
- 519 stores across the USA and online E-commerce;
- Launched a third-party marketplace in 2022, contributing approximately **4.2%** to the total revenue of $24 billion in 2023

Problem Statement


Macy's E-commerce → **Macy's Products**, **Marketplace Products**

Macy's expansion into the Marketplace risks potential **revenue loss** from including third-party products that **closely resemble** existing Macy's products.

Our solution **identifies these overlaps**, ensuring a unique and optimized product selection.

→ **Increased Revenue**
Improved Customer Experience

Challenges

Product nuances:
- silhouette, color, pattern, key elements
- brand, price, size, material


vs.


Diverse categories:
Phase 1: Women's swimwear
Phase 2: Women's dresses
⋮
Phase N: **ALL** product types
↓ Style diversity

Attribute variability:
Duplicates vary in specifications, titles, and images, making simple matching unreliable

Data Limitation:
Only five labeled pairs are provided, insufficient for building a supervised classification model

Data Sources

1.8M	20%	425
Unique Products	from Marketplace	Product Categories

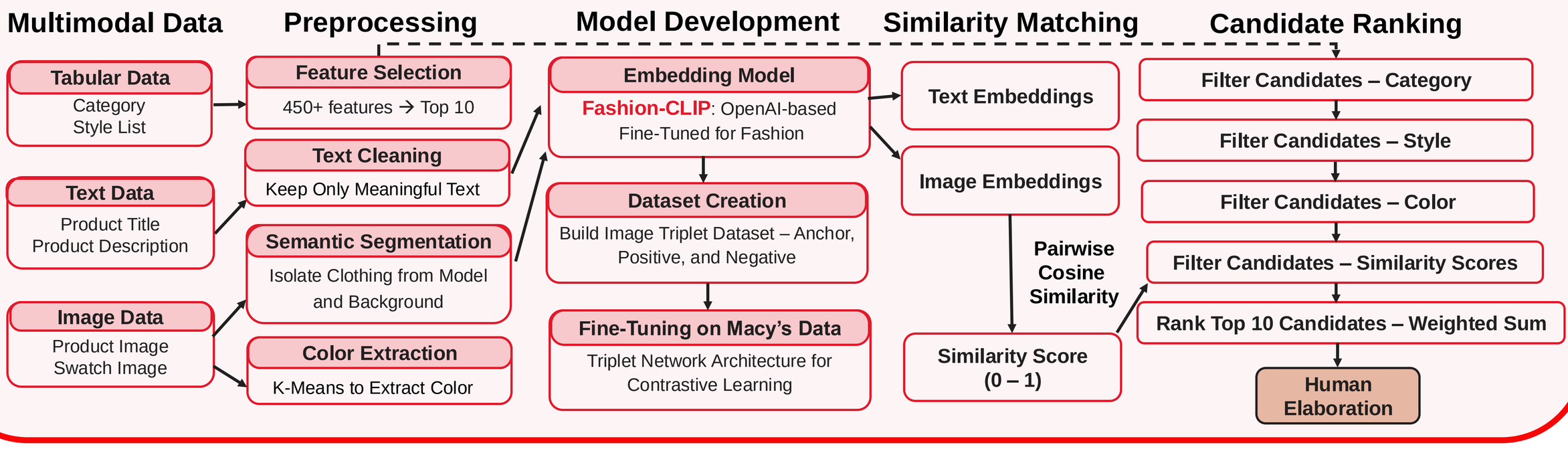
Tabular
Category, color, style pattern

Text
Product titles, descriptions

Image
Front view, close-up details

Miscellaneous
Inventory, fabric, occasion

Methodology



Model Results

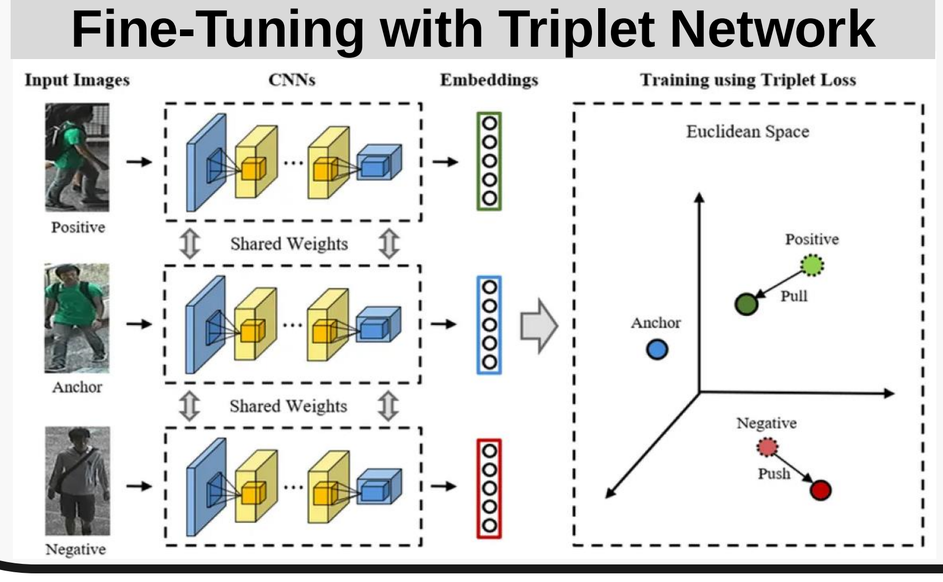
Precision@10
5% Baseline ↑ 93% Final Model

Identified Duplicates
↑ 550 %

Precision@10: Number of top 10 items matching at least 3 of silhouette, color, pattern, or key elements

Baseline: Filter candidates only by tabular features and ranked randomly

Fine-Tuning with Triplet Network



Example Similarity Search

The model returns the true duplicate product with the highest similarity score.

Business Impact

Multiple Use Cases
- Group existing similar products together and categorize new products into clusters of similar items.
- Store ranked matches with similarity scores in Macy's cloud and build a dashboard for labeling exact duplicates and non-duplicates.
- Integrate model into product recommendation systems for enhanced relevance and diversity of suggestions.

→ By eliminating duplicate products across all categories, the estimated cost savings is up to **$3.9M**.

→ Boosted the current number of identified duplicates by **550%**.

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