Automated Fashion Size Normalization

Eddie S.J. Du, Chang Liu, David H. Wayne

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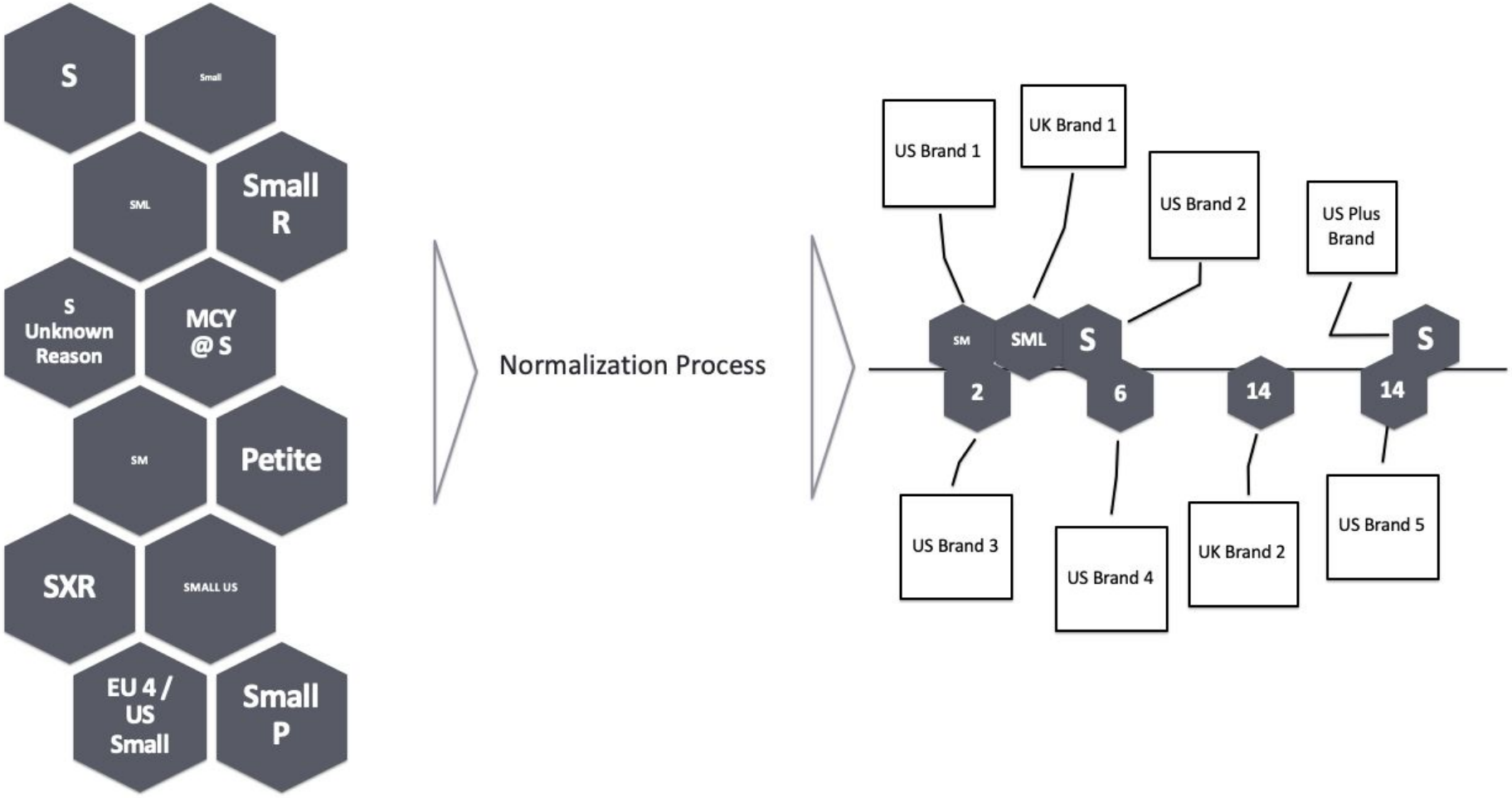
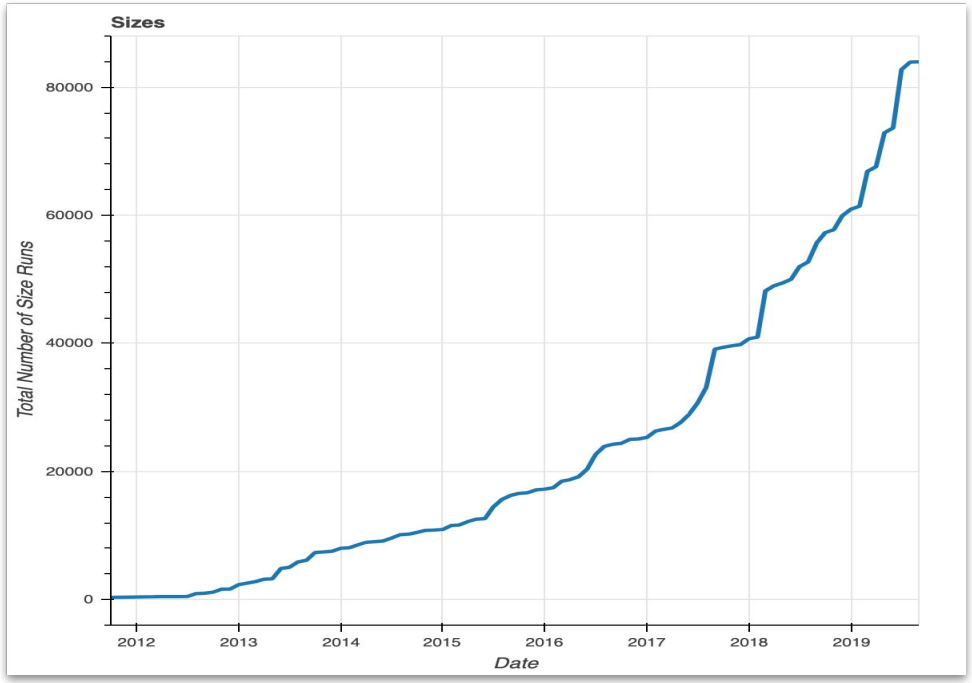
Size Normalization

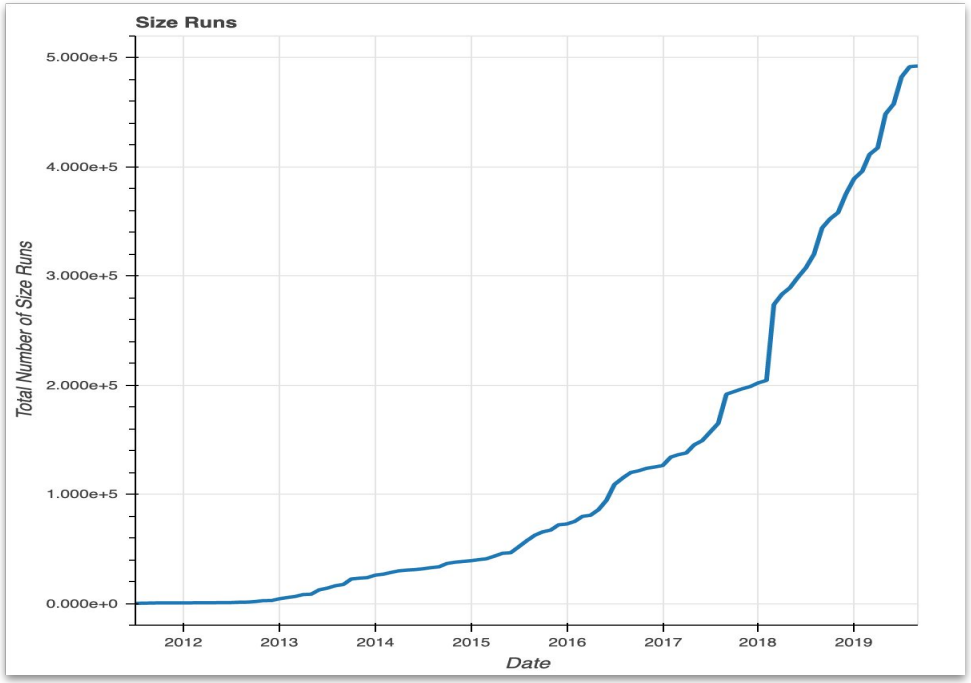


Scale of Size Normalization Problem

- 83,977 distinct sizes



- 492,567 distinct size runs



Notes

1. **Normalization on Category-Brand-Size**

   eg. (*Men's Shoes*, *Nike*, *"12C"*) → *54*

2. **Only using transaction data**

   No Feedback, eg. "Too small" or "Too big"

   No extra user or item information, eg. height, weight, etc.

Proposed Solution

$$\min \sum_{i=0}^{|\mathcal{B}|} \sum_{j=i+1}^{|\mathcal{B}|} \sum_{m=0}^{|\mathcal{S}_{b_i}|} \sum_{n=0}^{|\mathcal{S}_{b_j}|} F_{(b_i,s_m),(b_j,s_n)} * (x_{b_i,s_m} - x_{b_j,s_n})^2$$

Proposed Solution

$$\min \sum_{i=0}^{|\mathcal{B}|} \sum_{j=i+1}^{|\mathcal{B}|} \sum_{m=0}^{|\mathcal{S}_{b_i}|} \sum_{n=0}^{|\mathcal{S}_{b_j}|} F_{(b_i,s_m),(b_j,s_n)} * (x_{b_i,s_m} - x_{b_j,s_n})^2$$

For every ***brand***

Proposed Solution

$$\min \sum_{i=0}^{|\mathcal{B}|} \sum_{j=i+1}^{|\mathcal{B}|} \sum_{m=0}^{|\mathcal{S}_{b_i}|} \sum_{n=0}^{|\mathcal{S}_{b_j}|} F_{(b_i,s_m),(b_j,s_n)} * (x_{b_i,s_m} - x_{b_j,s_n})^2$$

For every ***brand*** For every ***size*** in the brand

Proposed Solution

$$\min \sum_{i=0}^{|\mathcal{B}|} \sum_{j=i+1}^{|\mathcal{B}|} \sum_{m=0}^{|\mathcal{S}_{b_i}|} \sum_{n=0}^{|\mathcal{S}_{b_j}|} F_{(b_i,s_m),(b_j,s_n)} * (x_{b_i,s_m} - x_{b_j,s_n})^2$$

For every ***brand*** For every ***size*** in the brand

Minimize distance in shared space.

Proposed Solution

$$\min \sum_{i=0}^{|\mathcal{B}|} \sum_{j=i+1}^{|\mathcal{B}|} \sum_{m=0}^{|\mathcal{S}_{b_i}|} \sum_{n=0}^{|\mathcal{S}_{b_j}|} F_{(b_i,s_m),(b_j,s_n)} * (x_{b_i,s_m} - x_{b_j,s_n})^2$$

For every ***brand*** For every ***size*** in the brand

Weighted by the ***copurchase frequency.***

Minimize distance in shared space.

Proposed Solution

$$\min \sum_{i=0}^{|\mathcal{B}|} \sum_{j=i+1}^{|\mathcal{B}|} \sum_{m=0}^{|S_{b_i}|} \sum_{n=0}^{|S_{b_j}|} F_{(b_i,s_m),(b_j,s_n)} * (x_{b_i,s_m} - x_{b_j,s_n})^2$$

For every ***brand*** For every ***size*** in the brand

Weighted by the ***copurchase frequency.***

Minimize distance in shared space.

$$+ \sum_{i=0}^{|\mathcal{B}|} \frac{0.1}{|S_{b_i}|} \left(x_{b_i,s_{|S_{b_i}|}} - x_{b_i,s_0} \right)$$

$$\text{s.t.} \quad x_{b_i,s_{m+1}} - x_{b_i,s_m} \geq 0.1 \qquad \forall b_i \in \mathcal{B}, m \in S_{b_i}$$

Make sure that ***sizes on the extremes*** gets assigned reasonable values.

eg. XXXS, XXXL

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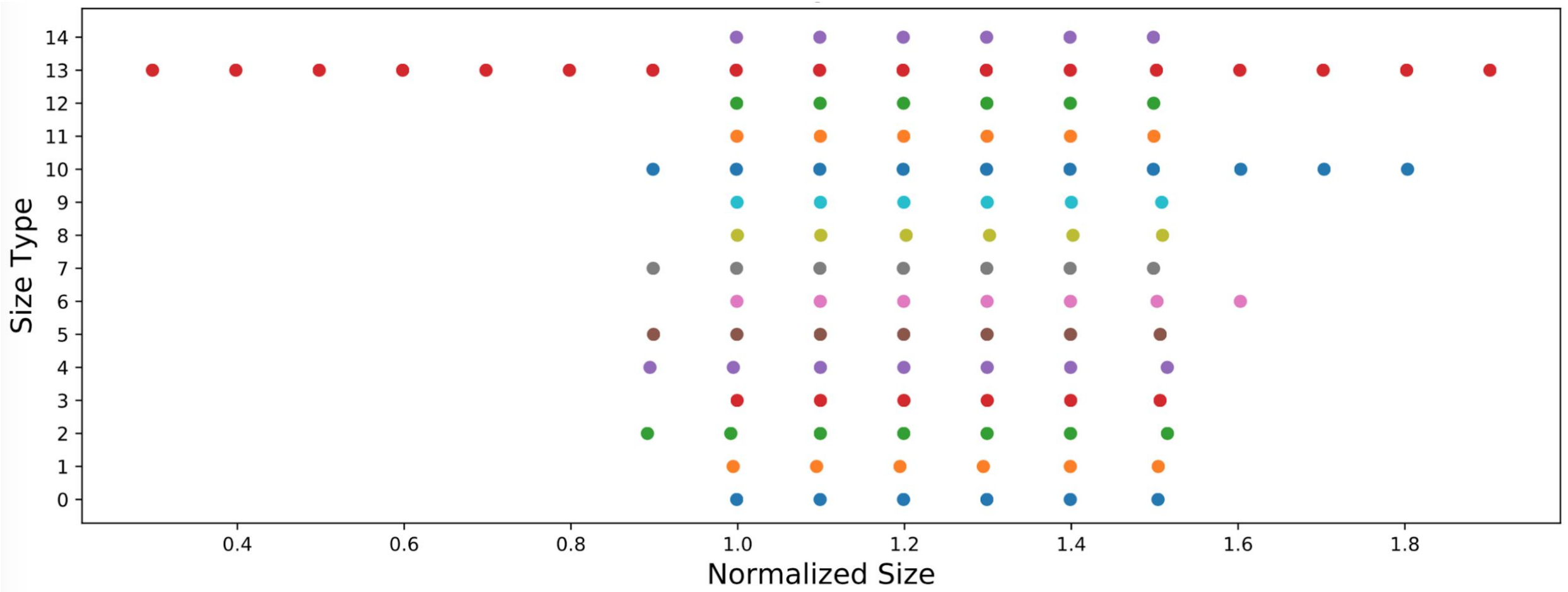
Results - Womens Shoes



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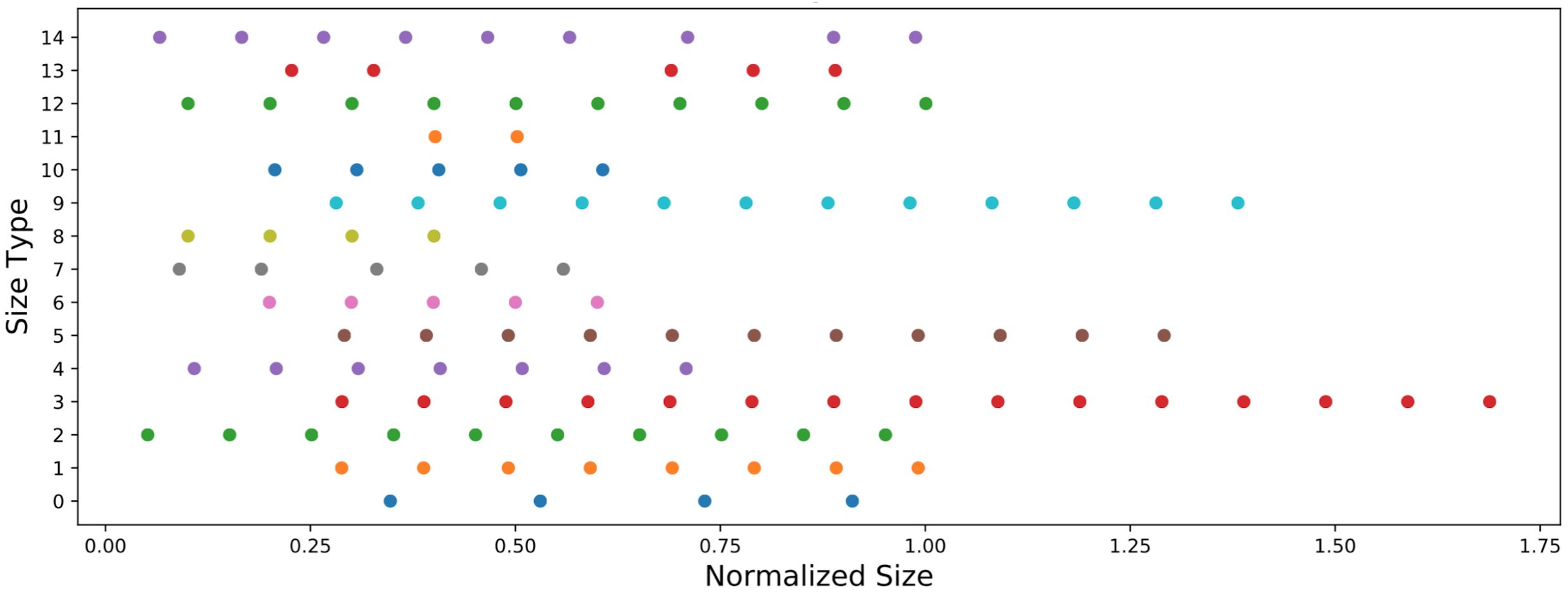
Results - Womens Dresses



Results

	First Year Accuracy (Training Set)			Second Year Accuracy (Test Set)		
	GD	QP	Human	GD	QP	Human
Women's shoes	62%	62%	64%	60%	60%	67%
Women's dresses	58%	58%	59%	50%	50%	58%

Train: Off by ***1-2%***

Test: Off by ***up to 8%***

Thank you & Come to our poster!

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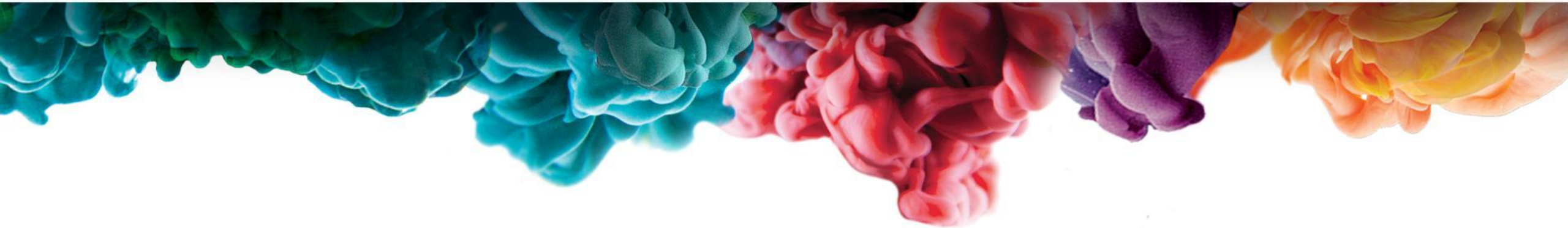

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