CP decomposition with alignment

Geonwoo Ban

Pusan National University
Department of Statistics

2022 3/10

List

CP decomposition

- Resize image to lower dimension $\rightarrow$ **Check**
- Compare the alignment effect $\rightarrow$ **Check**
- Find rotation effect in CP decomposition $\rightarrow$ **Check**

Data

Sets

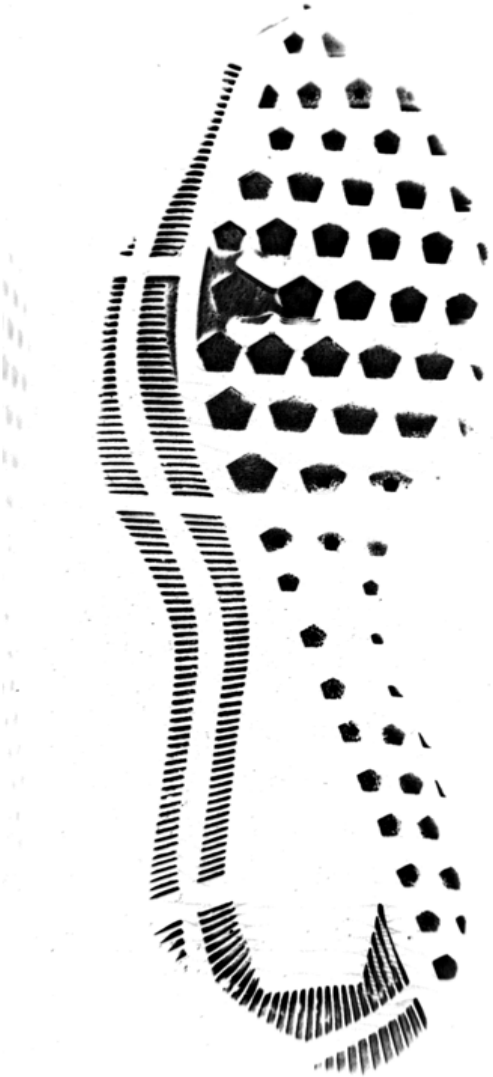
- Left side
- Two brands; Nike, Adidas
- Four sample; A(Nike), B(Nike), C(Adidas), D(Adidas)
- Two images for one sample; A1, A2, B1, . . . , D1, D2
- Rank 1 CP-decomposition **after alignment**

Additinal options

- Alignment : SHIFT(80 descriptors)
- Resize to 224×224

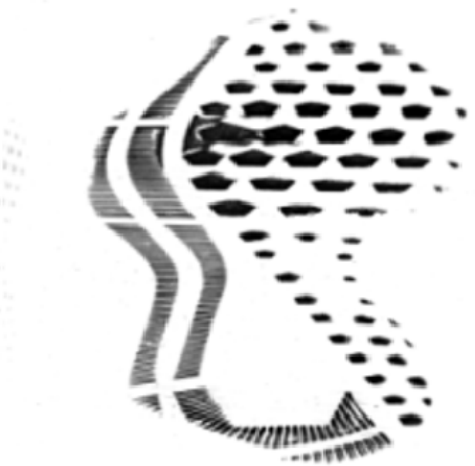
Images

A images before alignment and resizing



Images

A images after alignment and resizing



Images

C images before alignment and resizing

Images

C images after alignment and resizing

Decomposed vector

Result table

	$mean(d_1)$	$mean(d_2)$	$mean(d_3)$	$mean(TW)$
Matching	0.0669	**0.0395**	0	**0.1064**
Non-matching (same brand)	0.0793	0.0544	0	0.1189
Non-matching (different brand)	**0.0668**	0.0468	0	0.1135

- $mean(d_1)$: Mean of the height-axis distance
- $mean(d_2)$: Mean of the width-axis distance
- $mean(d_3)$: Mean of the color-axis distance
- $mean(TW)$: Mean of the total weight$(d_1 + d_2 + d_3)$

Decomposed vector

Result table

Alignment	mean(d_1)	mean(d_2)	mean(d_3)	mean(TW)
Matching	**0.0206**	**0.0129**	0	**0.0335**
Non-matching (same brand)	0.0853	0.0571	0	0.1381
Non-matching (different brand)	0.0612	0.0412	0	0.1024

- $mean(d_1)$: Mean of the height-axis distance
- $mean(d_2)$: Mean of the width-axis distance
- $mean(d_3)$: Mean of the color-axis distance
- $mean(TW)$: Mean of the total weight($d_1 + d_2 + d_3$)

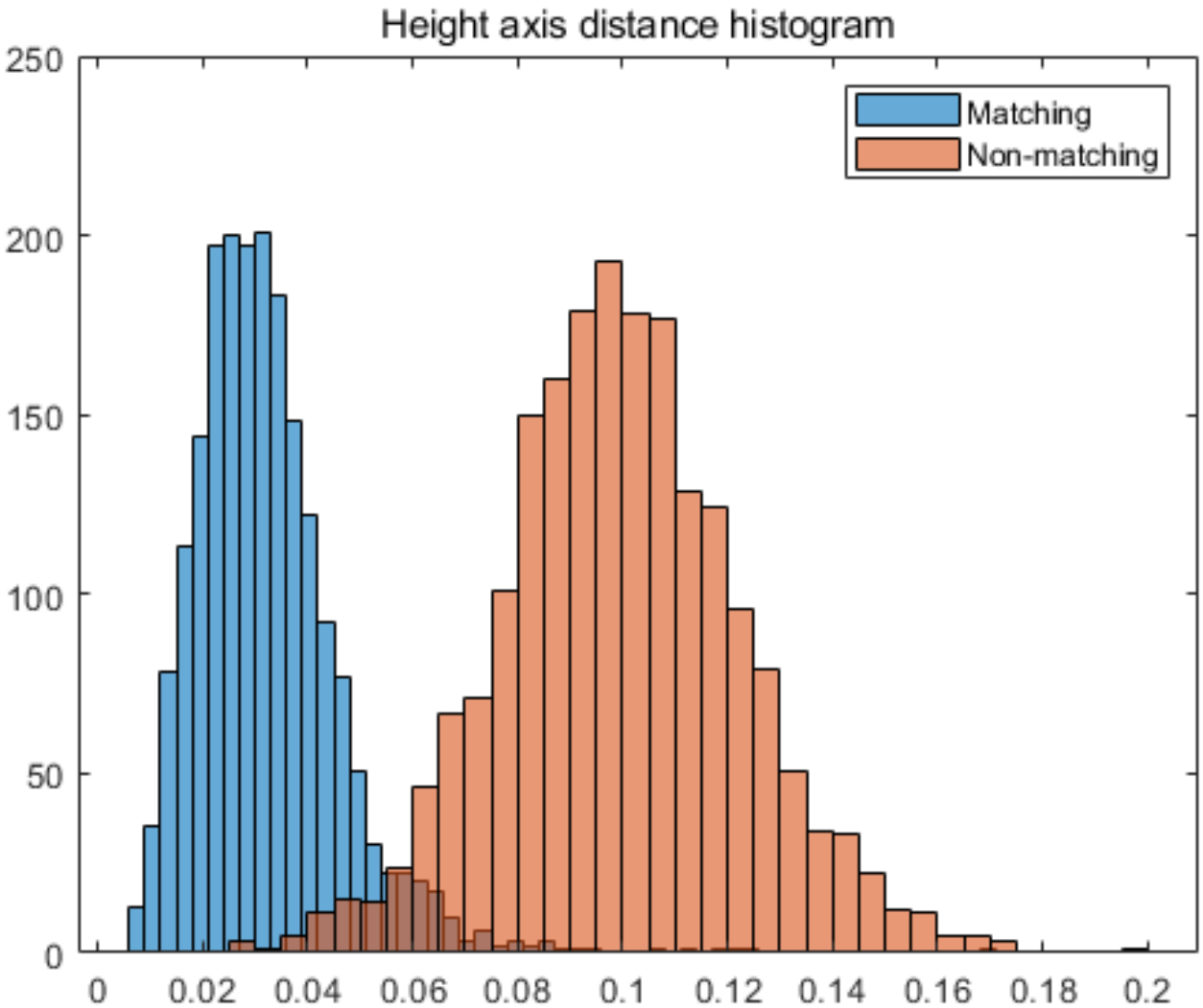
For large dataset

Dataset

- Aligned images
- 2,000 match pairs vs 2,000 non-match pairs
- Resized to 224×224
- Rank 1 CP-decomposition

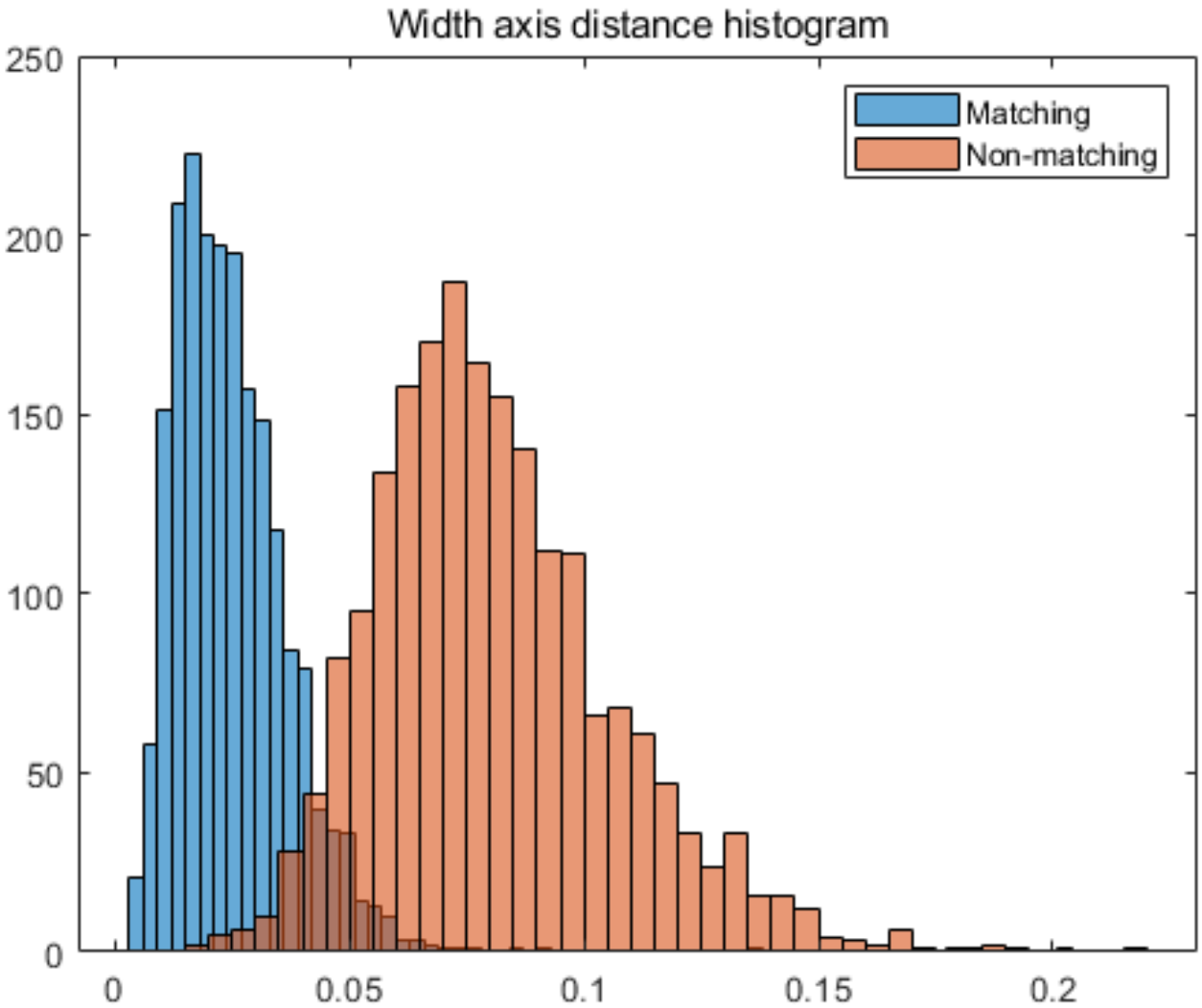
Histograms

Height axis distance(d_1)



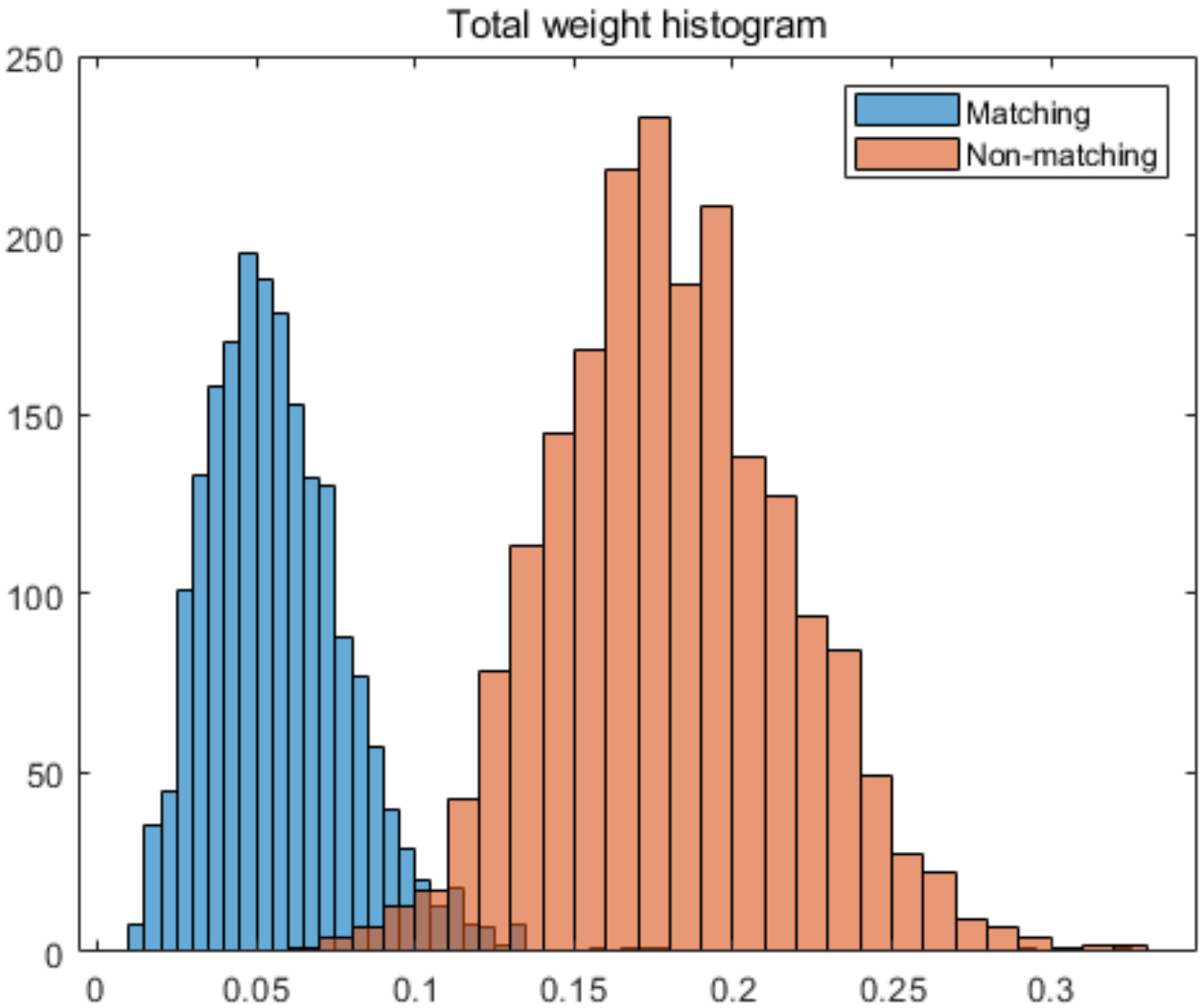
Histograms

Width axis distance(d_2)



Histograms

Total weight(TW)



Result

Distance mean table

2000 mat 2000 non-mat	mean(d_1)	mean(d_2)	mean(d_3)	mean(TW)
Matching	**0.0321**	**0.0250**	0	**0.0571**
Non-matching	0.0996	0.0809	0	0.1805

Next to do

- Calculate the distance for:
  - 2,000 train, 2,000 validation and 2,000 test
- Matching algorithm modeling
  - logistic, randomforest, etc.
  - deep learning methods