Department of Information Engineering
ENGG4920CO Thesis II
CHENG KIM HO 1155030233 KWOK CHIU HO 1155034192 TSE MIU TSZ 1155030328

CLOTHES VERIFICATION

香港中文大學
The Chinese University of Hong Kong

INTRODUCTION

- More and more fashion related applications have been developed
- **Our Objective:** To develop a system that automatically verifies clothes

METHODOLOGY

- white
- red
- green
- plaid pattern
- with scarf
- with placket
- low exposure
- with long sleeves
- men's

- white
- green
- brown
- black
- stripe pattern
- low exposure
- with long sleeves
- women's

Data Collection

To collect around 1000-2000 clothing images from the internet

Labelling

To label all the images with 23 attributes:

black	white	strip pattern	blue
yellow	collar	brown	many colors
gender	cyan	floral pattern	necktie
gray	graphic pattern	placket	green
plaid pattern	scarf	purple	solid pattern
skin exposure	red	spot pattern	

Training

To train our system with 1856 different labelled clothing images

Testing

To check the performance of our system with 200 different manually labelled clothing images

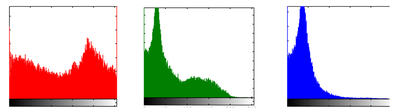
Feature Extraction

To convert the raw data into vectors of attributes by extracting 4 different features from the images

Color | **LBP** | **SIFT** | **HOG**

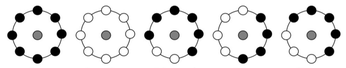
Color

To extract the color histograms of each color channels (RGB)

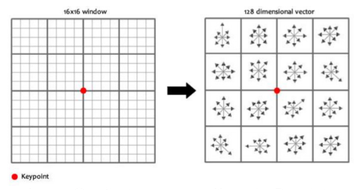


Local Binary Patterns (LBP)

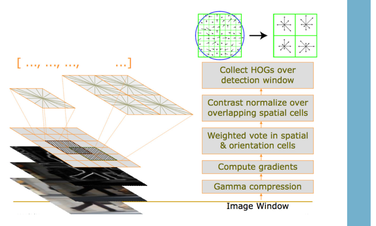
To extract LBP descriptor



SIFT



HOG



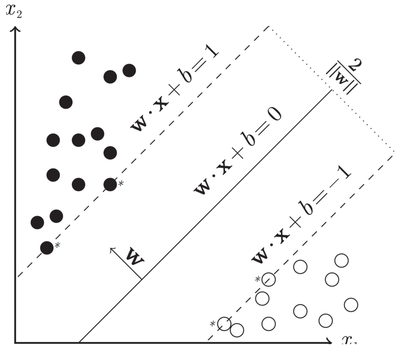
Feature Extraction → Process → Classification

Classification

To classify clothing images into different classes by SVM

Support Vector Machine (SVM)

- To construct hyperplane(s) in a high-dimensional space
- To generate a margin
- To judge which side of margin the feature vectors are on
- Large margin between two support hyperplanes makes a good classification



RESULTS

$$\text{Accuracy} = \frac{\text{the no. of images with matching labels}}{\text{total no. of testing images}}$$

	KNN				SVM			
Attributes	Color	LBP	SIFT	HOG	Color	LBP	SIFT	HOG
black	0.585	0.580	0.615	0.570	0.705	0.614	0.647	0.621
blue	0.900	0.900	0.900	0.845	0.862	0.802	0.776	0.781
brown	0.815	0.780	0.760	0.770	0.820	0.784	0.766	0.777
cyan	0.870	0.900	0.905	0.915	0.920	0.876	0.865	0.870
gray	0.680	0.680	0.680	0.710	0.690	6090.	0.634	0.630
green	0.960	0.950	0.930	0.955	0.905	0.872	0.893	0.881
purple	0.935	0.930	0.935	0.930	0.893	0.890	0.891	0.890
red	0.945	0.940	0.945	0.940	0.911	0.872	0.848	0.852
white	0.720	0.680	0.695	0.630	0.663	0.578	0.649	0.587
yellow	0.930	0.925	0.925	0.935	0.943	0.907	0.915	0.910
many colors	0.920	0.920	0.920	0.920	0.796	0.795	0.773	0.780
collar	0.535	0.530	0.535	0.510	0.638	0.571	0.646	0.593
gender	0.545	0.570	0.535	0.590	0.658	0.646	0.638	0.636
necktie	0.865	0.820	0.810	0.800	0.786	0.763	0.766	0.762
floral pattern	0.975	0.980	0.985	0.985	0.923	0.935	0.929	0.925
graphic pattern	0.980	0.960	0.940	0.990	0.927	0.922	0.950	0.926
plaid pattern	0.935	0.903	0.895	0.880	0.863	0.862	0.858	0.855
solid pattern	0.540	0.603	0.605	0.650	0.679	0.682	0.711	0.681
spot pattern	0.975	0.980	0.980	0.980	0.876	0.906	0.918	0.882
stripe pattern	0.945	0.925	0.930	0.930	0.841	0.876	0.880	0.832
placket	0.650	0.620	0.580	0.595	0.703	0.664	0.703	0.675
scarf	0.770	0.770	0.745	0.755	0.720	0.685	0.716	0.692
skin exposure	0.875	0.880	0.875	0.905	0.800	0.755	0.786	0.761

- Only color and pattern attributes have high accuracy
- May be affected by irrelevant info from the background

Comparing Results by KNN and SVM

- generally similar
- some results from SVM model have higher accuracy
- e.g. collar, gender, solid pattern, placket
- process time of SVM is much faster than KNN

Conclusion

- differentiation of colors and patterns by SVM has the highest accuracy
- use color differentiation as our project's main feature