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# Makeup or Not

— Jiaxin Li & Meng Zhang —

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# Distinguish Makeup or Not



# Motivation - Makeup Detection



**Face Detection**



**Laboratory Safety Requirements**

# Related Work - Text Analysis for Cosmetic Products

## Cosmetic Ingredient Database - Ingredients and Fragrance Inventory



Information

Table

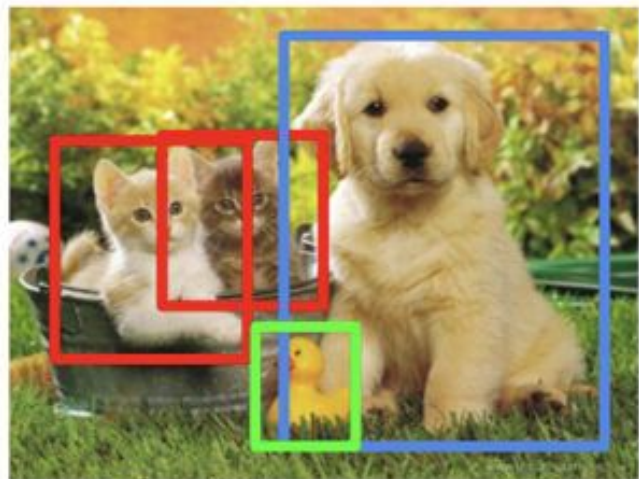
Analyze

Export

API

	Update Date	COSING Reference Number	INCI Name	Function	Restriction	INN Name	Ph. E
1	October 15, 2010	76114	DMAPA ACRYLATES/ACRYLIC ACID/A	FILM FORMING, VISCOSITY CONTRO			
2	October 15, 2010	33725	DNA	SKIN CONDITIONING			
3	October 15, 2010	33728	DODECYL GALLATE	ANTIOXIDANT		dodec	
4	October 15, 2010	76131	DODOXYNOL-9	EMULSIFYING, SURFACTANT			
5	May 8, 2016	94666	ELEOCHARIS DULCIS TUBER EXTRAC	SKIN CONDITIONING			
6	May 7, 2012	88848	EMPETRUM NIGRUM CALLUS CULTU	ANTIOXIDANT, SKIN CONDITIONING			
7	October 15, 2010	83196	ENANTIA CHLORANTHA BARK EXTRA	SKIN CONDITIONING			
8	October 15, 2010	56138	ENDOMYCES FERMENT FILTRATE	SKIN CONDITIONING			
9	October 15, 2010	56139	ENDOMYCES/AESCULUS HIPPOCAST	SKIN CONDITIONING			
10	May 7, 2012	88776	ENTEROMORPHA PROLIFERA WATER	HUMECTANT, SKIN CONDITIONING, €			
11	October 15, 2010	56147	EPIGAEA REPENS LEAF EXTRACT	SKIN CONDITIONING			
12	October 15, 2010	84565	ERGOCALCIFEROL	SKIN CONDITIONING	II/335		
13	December 15, 2011	88632	ESCHSCHOLTZIA CALIFORNICA LEAF	SKIN PROTECTING			
14	February 3, 2011	39816	ETHOXY-METHOXYMETHYL-PHENOL	PERFUMING			
15	February 3, 2011	39821	ETHYL 3-HYDROXY-2-PHENYLPROP	PERFUMING			

# Related Work - Object Detection



CAT, DOG, DUCK

**Animal Detection**

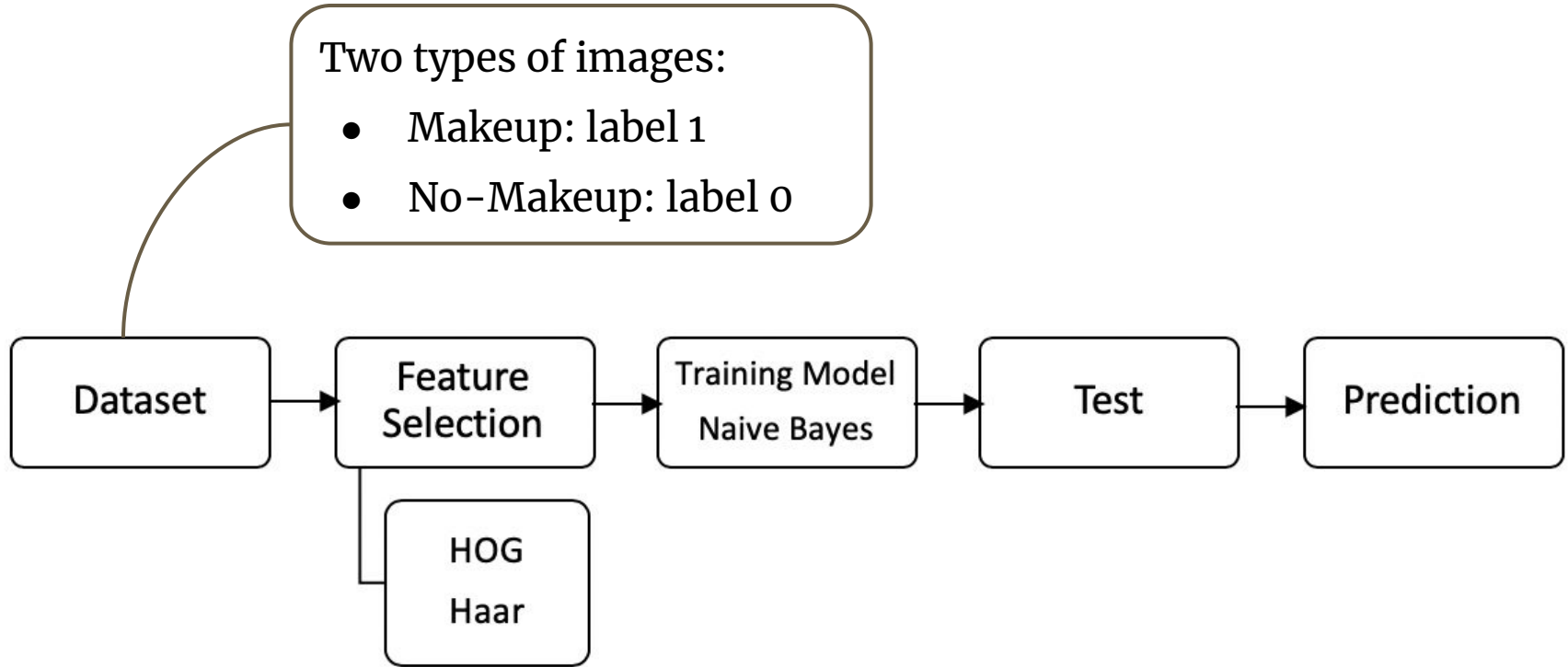


**Car Plate Detection**

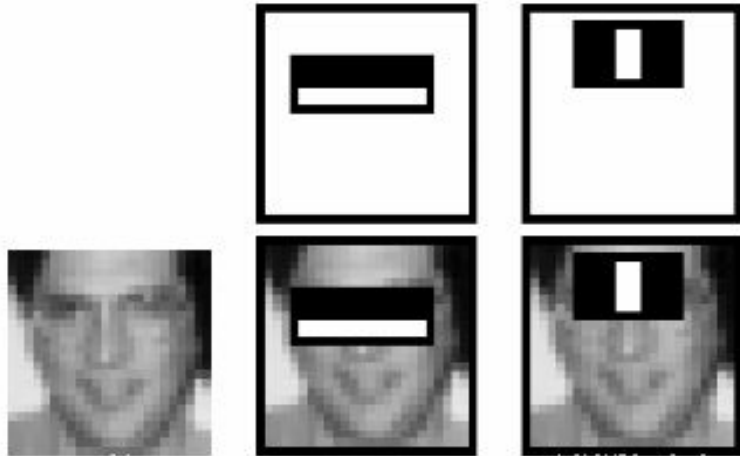
<http://res.cloudinary.com/dyd911kmh/image>

[https://www.researchgate.net/profile/Jun\\_Wei\\_Hsieh2/publication/220050821/figure](https://www.researchgate.net/profile/Jun_Wei_Hsieh2/publication/220050821/figure)

# Flowchart



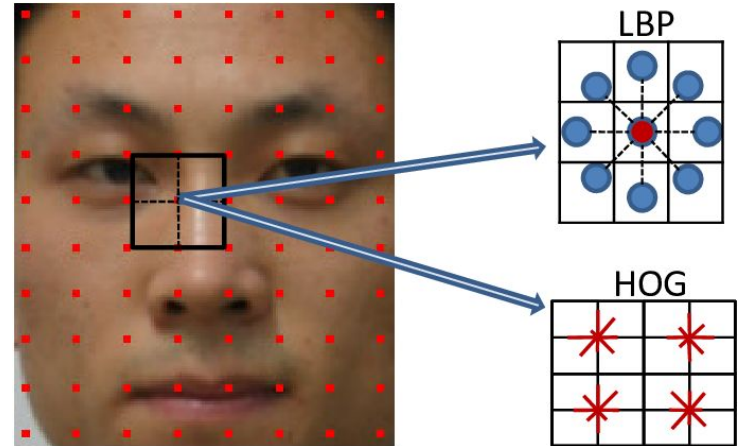
# Feature Selection



**Haar Feature**



**Canny Feature**



**HOG LBP Feature**

# Feature Selection Results

```
img=resize(img, (255,255))
greyscale_image=color.rgb2gray(img)

feature1=feature.hog(greyscale_image,
orientations=9,pixels_per_cell=(8,8),
cells_per_block=(1,1))
feature2=feature.canny(greyscale_image,
sigma=3.0)
feature3=feature.local_binary_pattern(greyscale_image,10,5)
feature4=feature.haar_like_feature(greyscale_image,0,0,5,5)
featureVector=np.concatenate((feature1,feature4),axis=None)
```

Feature	Accuracy
HOG	0.6475
Canny	0.5525
LBP	0.5675
Haar	0.5475
HOG + Canny	0.6275
HOG + LBP	0.565
<b>HOG + Haar</b>	<b>0.66</b>
HOG + Canny + Haar	0.6125
HOG + Canny + LBP	0.565
Canny + LBP + Haar	0.565
HOG + LBP + Haar	0.565

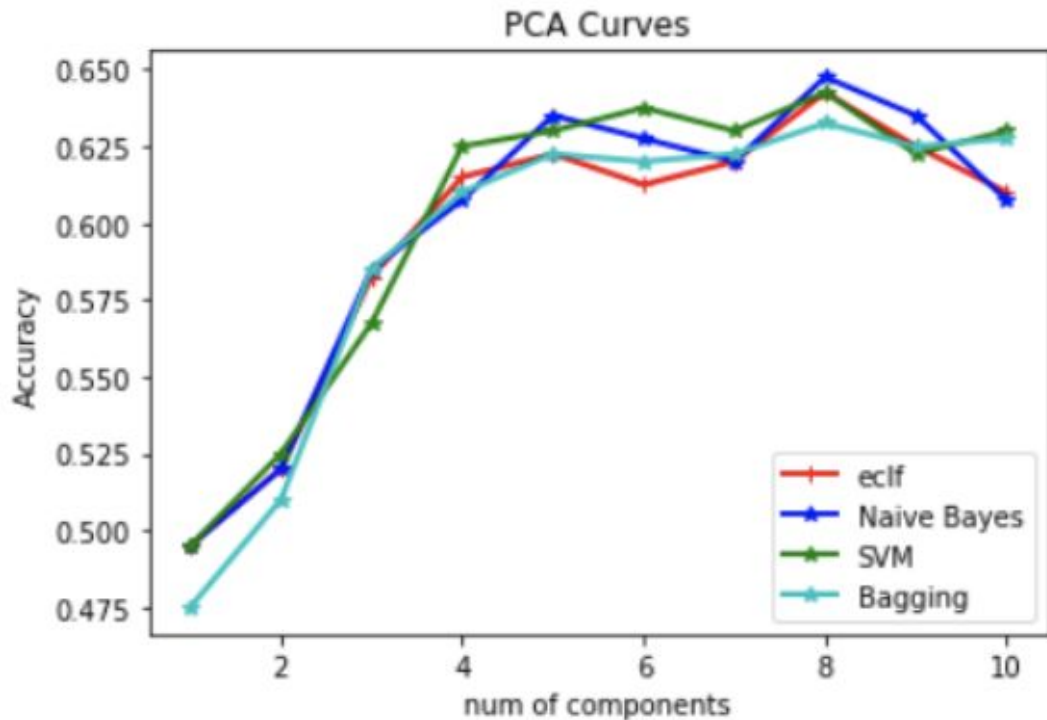


# Classifier Selection

```
clf1=GaussianNB()
clf2=DecisionTreeClassifier()
clf3=KNeighborsClassifier()
clf4=LinearSVC()
adabooster=AdaBoostClassifier(n_estimators=50)
bagging=BaggingClassifier(clf1)
eclf=VotingClassifier(estimators=[('gnb',clf1),('dt',clf2),('svm',clf4)],voting='hard')
scores=cross_val_score(clf4,X1,y_train, cv=5)
scores.mean()
```

Classifier	Accuracy
Naive Bayes	0.6799
Decision Tree	0.505
K Nearest Neighbor	0.515
SVM	0.66
Adaboost	0.5275
Bagging(Naive Bayes)	0.6775
Bagging(Decision Tree)	0.5275
Bagging(KNN)	0.5375
Bagging(SVM)	0.66
Majority Voting(NB+DT+SVM)	0.6699
Majority Voting(NB+KNN+SVM)	0.6575

# Dimensionality Reduction

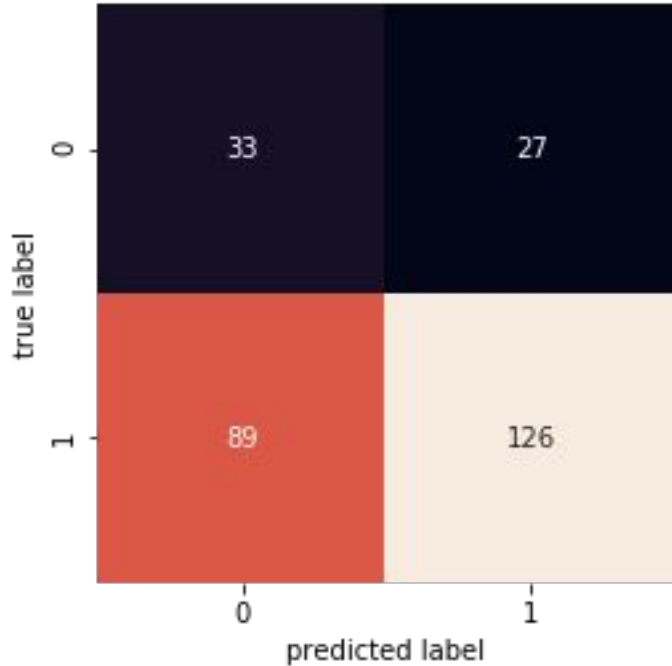


```
print (clf1score[7])
```

0.6475

*No Help*  
QAQ

# Performance Evaluation



Evaluation Metrics	Value
Accuracy	0.5782
Precision	0.5470
Recall	0.5680

# Limitation & Future Work

Imbalanced Data	
Makeup	1062 images
No-Makeup	444 images

**Solutions:** Collect More Data  
Resample Dataset  
Penalized Models

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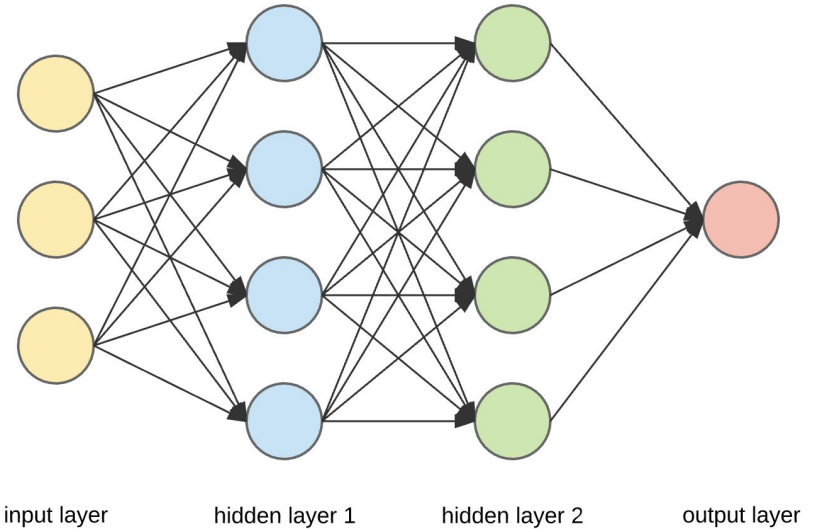


**Raw Data**  
**Clean and Preprocess in Advance**

# Limitation & Future Work



**Bias:** Focus more on Caucasian Female  
**Mistake Classification**



**Neural Networks**

# Future Work



- **Automatic Makeup**
- **Automatic Remover**

Q & A