Labradoodle or Fried Chicken?

BY GROUP 6

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Change on Feature Space

* What we did on original SIFT feature?
  - ADD RGB (1000 features)

* Why we add RGB

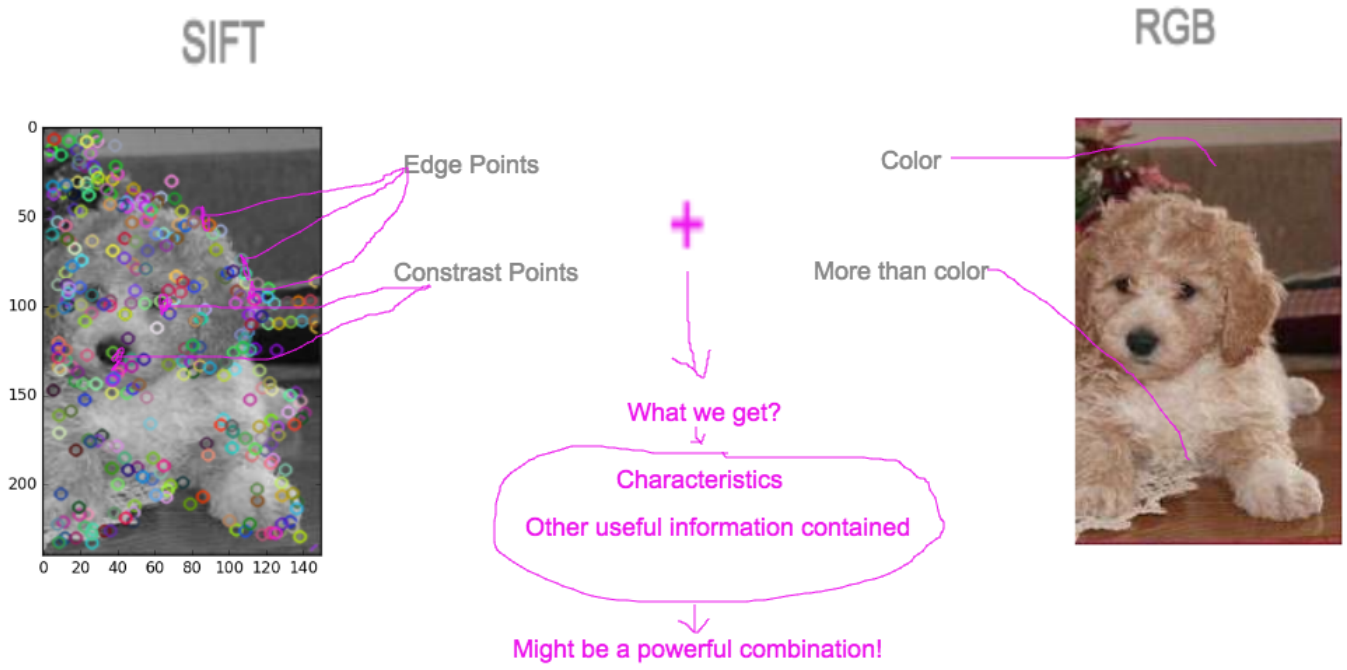
Change on Feature Space

Where is chicken most probably placed?
Maybe plates. Less likely sofa or grass.

How about the dog?
Maybe grass, or lying on some body. Less likely plates.

Backgrounds might be helpful to separate a dog and a chicken!

Change on Feature Space



Result:

GBM with Depth:4, Bagging: 0.5, # of tree: 1000 and Learning rate: 0.001

SIFT Only	SIFT + RGB
33%	22.7%

- Next: Quick Review on Methodology

Select a Classifier

- Linear boundary and non-linear boundary

Should be careful!

Dimensionality problem (P >> N)

What we did?

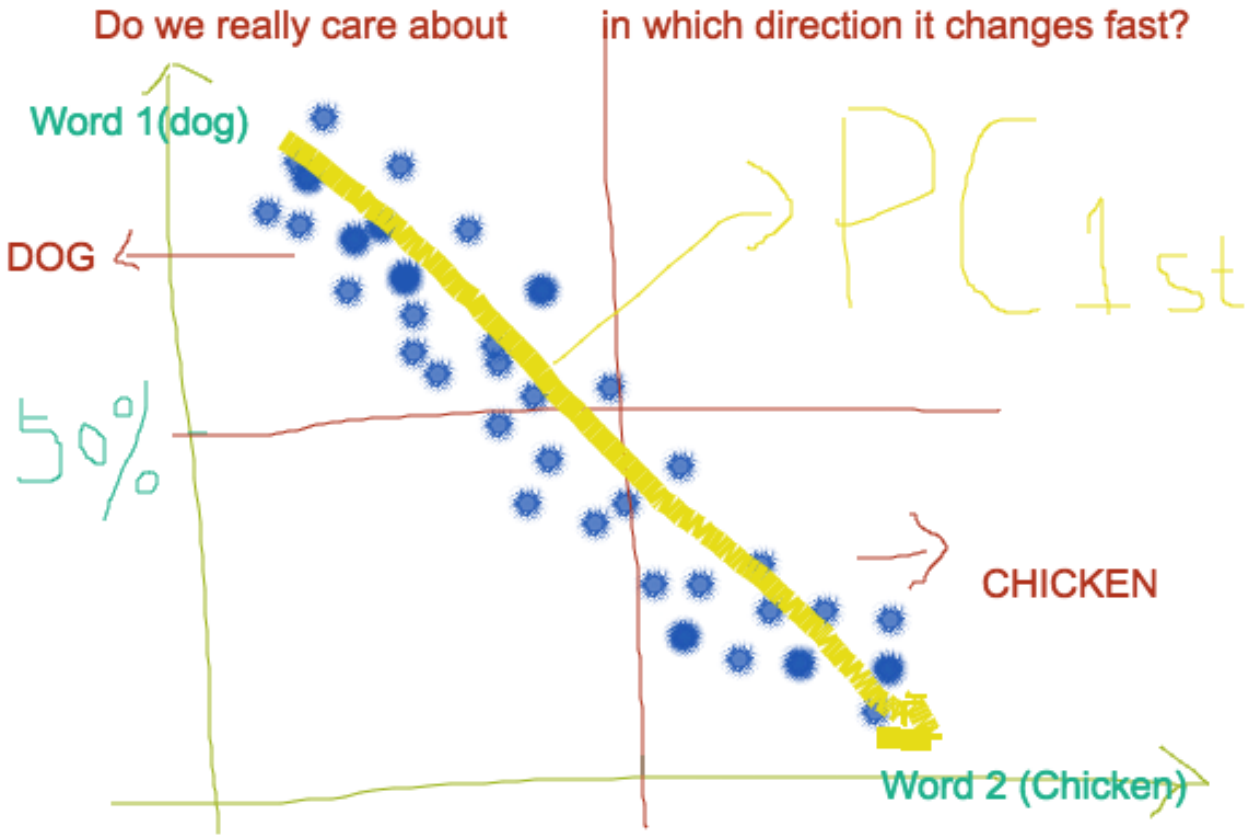
- PCA -> to project our data into PCs space

Comparison with same SVM parameters

SIFT Only	SIFT + RGB
26.01%	26.9%

Select a Classifier

? Is the information contained in the 2nd moment of data ENOUGH?



Maybe not.

Select a Classifier

- Bayes Method

e.g. Naïve Bayes.

Don’t need to care much about high-dimension

BUT: Independence assumption between the features? Not really meet. SIFT features are proportions!

Error rate: 41%

- Boosting Method

e.g. Random Forest (bagging, boosting), GBM

No specific boundary shape. No strong assumption. Overfitting can be remedied by bagging and shrinkage.
Error rate: 8.9%

Models Comparison

Features	Algorithms	PCA	Parameters	Error Rate
SIFT	GBM	No	TreeDepth:3 ntree = 2000	*32.2%*
SIFT + RGB	GBM	No	TreeDepth:3 ntree = 2000	*21.4%*
SIFT + RGB	GBM	Yes	TreeDepth:3 ntree = 2500	*31.7%*
SIFT	SVM	No	Cost = 1 Gamma = 0.5	*42%*
SIFT	SVM	Yes	Cost = 1 Gamma = 0.5	*26%*
SIFT + RGB	SVM	Yes	Cost = 1 Gamma = 0.5	*20.75%*
SIFT	RF	No	ntree = 200	*30%*
SIFT	NB	No	Gaussian	*41%*
RGB	RF	No	ntree = 500	*20.55%*
RGB	SVM	No	Cost = 1 gamma = 0.5	*21.56%*
SIFT + RGBPlus	**GBM**	**No**	**TreeDepth:11 ntree = 100**	***8.9%***

Laptops: I need a rest

- Final Result

Time to train: 401 s. To extract features: 164s.

	<Our's>Test Labels		<Base>Test Labels	
<true>	chicken	dog	chicken	dog
chicken	179	15	133	77
dog	21	185	67	123

Potential Problem:

- How much can we trust cross-validation result?

Not precise!

e.g. 5-fold CV, the five folds are not independent!