CS231N LECTURE2

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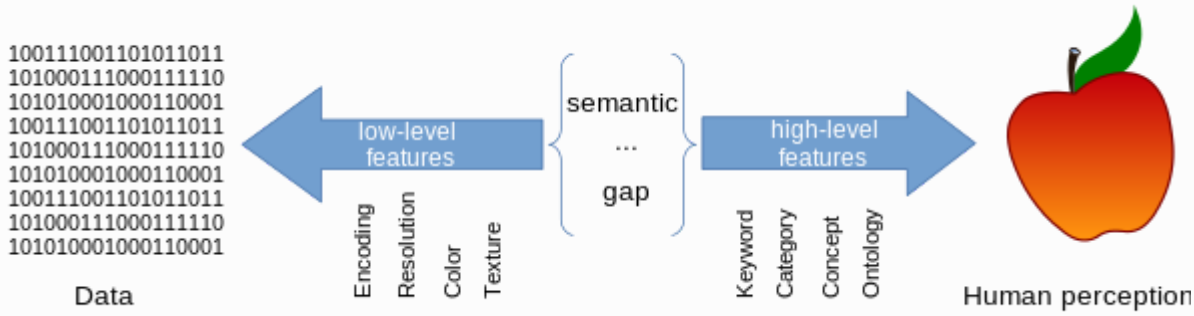
Sematic gap

Challenges

Q & A

SEMATIC GAP

Width x Height x RGB (complexity of tasks)



CHALLENGES

1. Viewpoint Variation: zoom, shift, all pattern is changed
2. Illumination:brightness value
3. Deformation:for example, strange images
4. Occlusion:hidden foreground object
5. Backgroundclutter: how to distinguish between foreground and background
6. Intra-classvariation: full species that look similar

*Training example for pattern matching base on **ImageNet** – CIFAR-10: 10 labels and 50,000 training images [32x32], 10,000 test images

L1 distance: $d_1(I_1, I_2) = \sum_p |I_1^p - I_2^p|$

test image					training image					pixel-wise absolute value differences				
56	32	10	18	-	10	20	24	17	=	46	12	14	1	add → 456
90	23	128	133		8	10	89	100		82	13	39	33	
24	26	178	200		12	16	178	170		12	10	0	30	
2	0	255	220		4	32	233	112		2	32	22	108	

Q & A

Q. How does the classificationspeed depend on the size of the training data?

- Linearlyindependently,
- CNNs:despite of expensive training, it is possible to test in real time.

Q. What is the accuracy of the nearest neighbor classifier on the training data, when using the Euclidean distance?

- 100%
- We're always find a training example exactly on top of that test which has 0distance, according to data manifold.

Q. What if using Manhattan distance instead?

- Absolute value, it will be same as well.

Q. What is the accuracy of the k-nearest neighbor classifier on the training data?

- Basically, the point around you overwhelmed, the best example is of a different class.

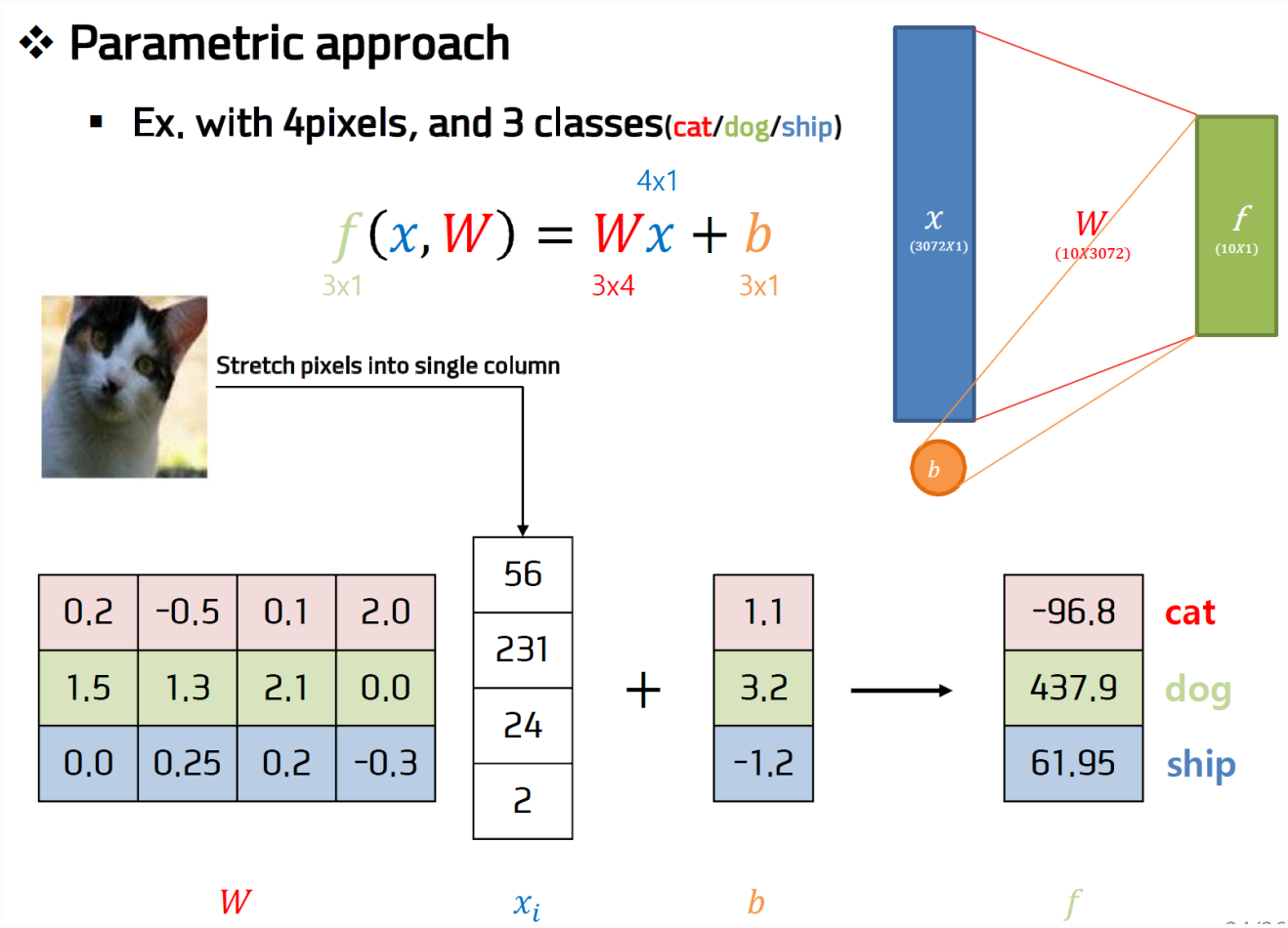
Q. How do we set the hyper-parameters?

- Very problem-dependent
- Justtry them all out and see what works best
- K-nearest neighbor on images never used due to shifted, messed up and darkened image

Parametric approach

- It is going to be choose parameters (weights)
- Linear classifier (w, b)

Q. What does the linear classifier do?



Q. How we could process differentscales from images?

- Resizethe different images easily such as augmentation.
- Jittering andstretching : huge amount of that stuff such that is rotated.

Q. Average of pixels?

- Work worse, it doesn't want to minimize the mean of images.

A feacture for images

- There are many label examples in images based on colors.

Q. If a class is imbalanced?

- The bias for imbalanced class would be higher because this classifier is just used to spewing out large numbers **based on the loss.**
- We must find data manofold what you want to do, jittering, rotating and separating out, for example, all the cars and non-cars.

Q. What would be a very hard set of classes for a linear classifier todistinguish?

- Negative Images mean to make the shape such as an edge but not exact color for the originalimage.
- In a image, forexample, there is a cat on the left side and there is also a cat next to it. It dosen't have problem, the weight would be shown on the pixels in the image.

Stacking linear classifiers

- The purpose for image classification is to minimize the loss, changing weights unitl loss is almost zero, and then that is classifying all the images unless it is higher loss.