Ferns for traffic sign detection

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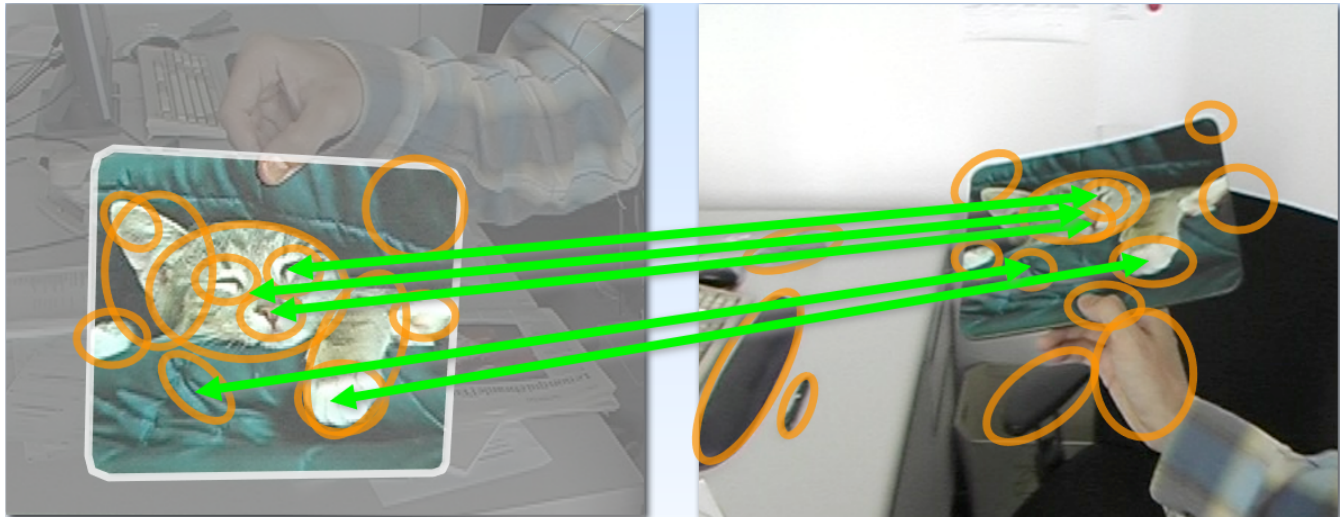
- Team Triforce

[Source: trafficsignstore.com]

Training



Trained Image

Input Image

[Source: campar.in.tum.de]

Training

We are looking for $\arg\max_i P(C = c_i \mid \mathbf{patch})$

If **patch** can be represented by a set of image features $\{f_i\}$:

$$P(C = c_i \mid \mathbf{patch}) = P(C = c_i \mid f_1, f_2, \ldots f_n, f_{n+1}, \ldots \ldots f_N)$$

which is proportional to

$$P(f_1, f_2, \cdots f_n,\ f_{n+1}, \cdots \cdots f_N \mid C = c_i)$$

but complete representation of the joint distribution infeasible.

Naive Bayesian ignores the correlation:

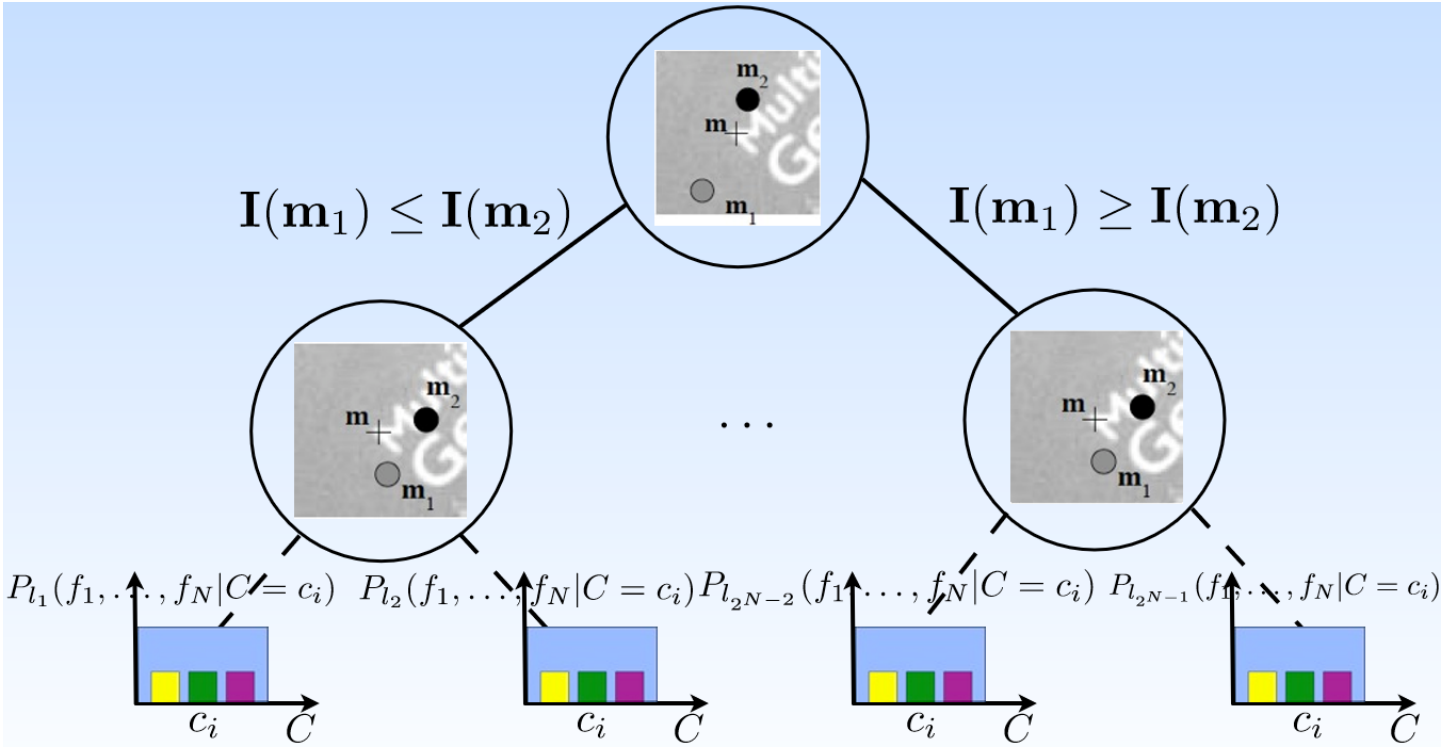
$$\approx \prod_j P(f_j \mid C = c_i)$$

Compromise:

$$\approx P(f_1, f_2, \cdots f_n \mid C = c_i) \times P(f_{n+1}, \cdots f_{2n} \mid C = c_i) \times \cdots$$

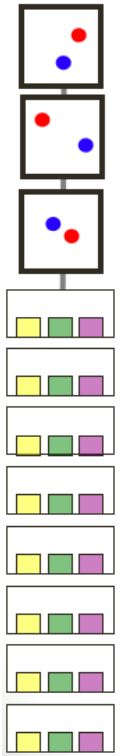
[Source: web.eecs.umich.edu/~silvio/teaching/EECS598_2010]

Training



[Source: campar.in.tum.de]

Training



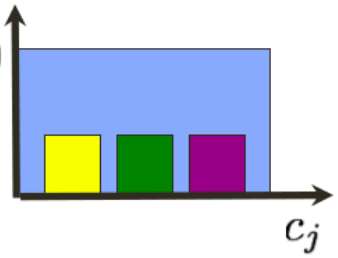
The tests compare the intensities of two pixels around the keypoint:

$$f_i = \begin{cases} 1 & \text{if } I(m_{i,1}) \leq I(m_{i,2}) \\ 0 & \text{otherwise} \end{cases}$$

Invariant to light change by any raising function.

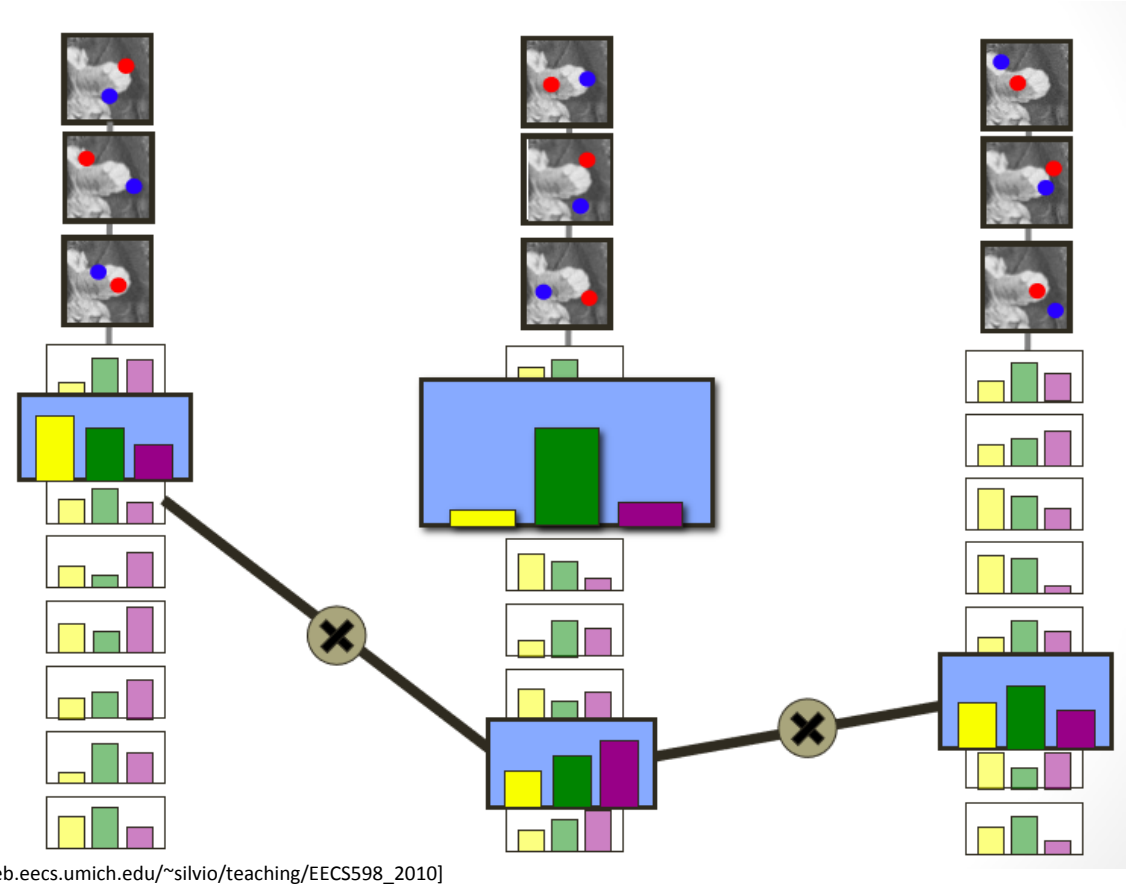
Posterior probabilities:

$$P(f_1, f_2, \cdots f_n \mid C = c_j)$$



[Source: web.eecs.umich.edu/~silvio/teaching/EECS598_2010]

Classifier



[Source: web.eecs.umich.edu/~silvio/teaching/EECS598_2010]

Roadmap

Milestone 1: Training (first week)
- Keypoint extraction from Training data
- Training the Ferns

Milestone 2: Classify (second week)
- Keypoint extraction and classification of test data

Milestone 3: Finalizing (last week)
- Testing and Tuning
- Finding and fixing bugs
- Extending

Future extends

Multiple Classes
3D Data sets

Questions ?

Thank you
for your attention