Ferns for traffic sign detection

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- Team Triforce

[Source: trafficsignstore.com]
Training

Trained Image

Input Image

[Source: campar.in.tum.de]

Team Triforce

Ferns for traffic sign detection
Training

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

If \text{patch} can be represented by a set of image features \( \{f_i\} \):

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

which is proportional to

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

but complete representation of the joint distribution infeasible.

Naive Bayesian ignores the correlation:

\[
\approx \prod_j P(f_j \mid C = c_i)
\]

Compromise:

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

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

[Source: campar.in.tum.de]
The tests compare the intensities of two pixels around the keypoint:

\[ f_i = \begin{cases} 
1 & \text{if } I(n_i,1) \leq I(n_i,2) \\
0 & \text{otherwise}
\end{cases} \]

Invariant to light change by any raising function.

Posterior probabilities:

\[ P(f_1, f_2, \cdots f_n | C = c_j) \]
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
Thank you for your attention