

The Role of Features, Algorithms and Data in Visual Recognition

Devi Parikh, Toyota Technological Institute, Chicago (TTIC)

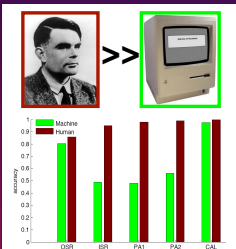
Larry Zitnick, Microsoft Research (MSR), Redmond

Why are humans better than machines at recognition?

Features?

Algorithms?

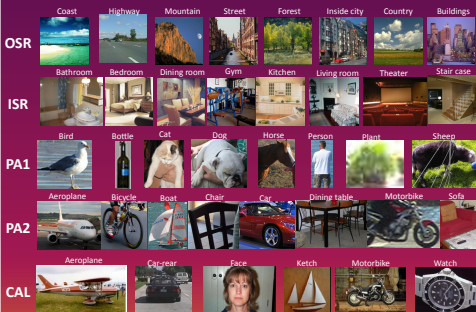
Data?



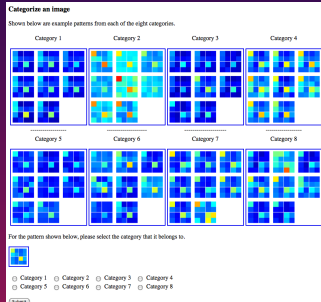
Experimental Set-up

- Datasets: OSR, ISR, PA1, PA2, CAL
- Features: CH (color hist), TH (texture hist), GIST, BOW (bag-of-words), ATT (attributes)
- Number training instances: 2, 4, 8, 16, 32, 64, 100(88 CAL)
- Number of dimensions: 4, 8, 16, 32, 64, 128, 256
- Amount of noise: 0%, 25%, 50%, 100%, 200%

Datasets

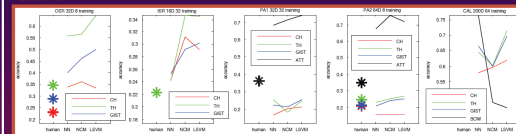


Example Human Study

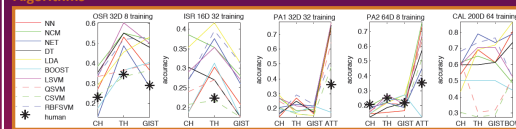


Results

Features



Algorithms



Data

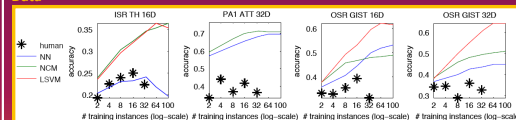
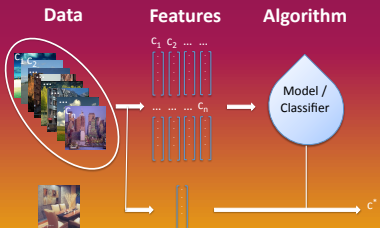
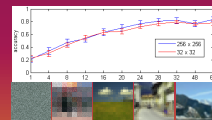


Image Classification Paradigm

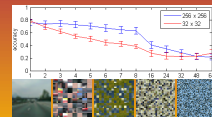


Human Adaptability to Features

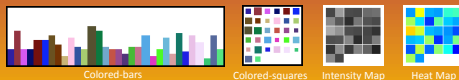
Locally shuffled (Block test)



Globally shuffled (Puzzle test)



Tested Feature Visualizations



Which factor?



Discussion

- Subjects don't seem to use nearest-neighbor
- Adaptability (features, classification strategy)
- "Learning"
- Beyond "Features": Semantic attributes, Multi-tasking
- Visual vs. non-visual features