Towards Robust, Real-Time Human Detection and Pose Estimation

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Human Detection
- Goal: Draw a bounding box around all humans in an image
- Applications: surveillance, sociology research, gaming

Poselets
- Novel human detection algorithm created by Lubomir Bourdev at Berkeley
- Poselet – Detectable part of a human pose
- Uses the locations of individual body parts to determine the location of the body

Enabling New Applications
- Original system was written in Matlab
- Several minutes to process a single image
- Many applications demand immediate results
- Optimized critical sections in C++ and CUDA to bring runtime to near real-time

Step 1: Feature Extraction
- Histograms of Oriented Gradients
- Gradient – Differences between neighboring pixels
- Parallelism: blocks can be independent

Step 2: SVM Evaluation
- Each column is an SVM for a specific poselet
- Linear SVMs: Matrix Multiplication

Step 3: Cluster Poselet Votes
- Each poselet votes for center of body
  - Example: Shoulder poselet has a guess for where the rest of the body is located
  - Agglomerative clustering of votes

Future Work
- Extend to real-time 3D pose estimation for video game interfaces
- Poselets vote for locations of key points in 3D configuration space rather than the torso center