Objective

- Detect and localise human hands in real-world still images.

Approach

Shape proposals
- Context detector
  - Context detector is learned just like the hand detector over the region around the hand bounding box.
  - Testing is performed at 10° intervals of rotation.
  - Max-pooling of scores is done over all boxes having the overlap score above 0.5.
  - Hand bounding boxes are obtained by shrinking the context boxes.

Skin proposals
- Skin detection and hypotheses generation
  - Skin colour model is learned locally from the face pixels.
  - Hysteresis thresholding gives better performance.
  - Lines are fitted to skin regions and hands are hypothesised at both ends of the lines.
  - If the skin region resembles a blob then the whole skin region is hypothesised as a hand.
  - Detection score is given by the proportion of skin pixels to other pixels in the largest super-pixel within the hypothesised box.

Proposal Methods
- Hand shape detector
  - Sliding window hand shape detector is learned using Felzenszwalb et al.’s parts based model over aligned hand instances.
  - The detector is trained as a mixture model with three components.
  - Testing is performed at 10° intervals of rotation of the image.

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Hypotheses classification
- Proposed hand boxes are scored by all three methods.
- The three scores are combined together to get the final score using a linear SVM classifier.
- The three proposal methods ensure good recall, and the discriminative classification ensures good precision.

Hand Dataset
- We have collected a comprehensive dataset of hand images.
- Download link: http://www.robots.ox.ac.uk/~vgg/research/hands/
- The annotation consist of a bounding rectangle, oriented with respect to the wrist.

Results
- System is trained using bigger hand instances of the train/val set of the hand dataset, the Signer dataset and the PASCAL VOC 2010 person layout test set.
- Experiments are performed over the test set of the hand dataset, the Signer dataset and the PASCAL VOC 2010 person layout test set.
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- More Results: http://www.robots.ox.ac.uk/~vgg/research/hands/results.html