

Combination of MRF and ShapeBM for Image Labeling

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The task is to label arbitrary images of objects using a shape prior

- arbitrary location of multiple objects on the image
- distinct size and rotation of objects



ShapeBM tuning

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ShapeBM is a model of shape which is tuned on the shapes:

- centered in the middle of the image,
- in the same direction (e.g. horses facing left),
- uniformly scaled relative to the size of the image.



ShapeBM + MRF — pros and cons

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- + Stores probability distribution on shapes which is tuned to a train dataset
- + Generates new shapes different from a training data
- + Cope an occlusion problem
- Not applicable for segmentation in case of arbitrary images
- Not effective in case of there are more than one object on an image.



Object detection + shape prior segmentation

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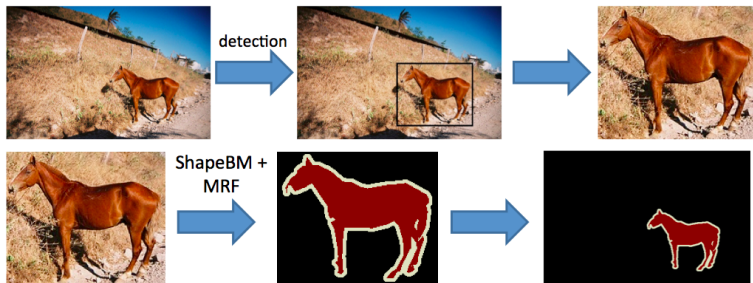
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Two step method:

- use an object detector to find a bounding box
- apply the segmentation method for the bounding box. The image areas may have wide variance of resolution, however our method allows use one ShapeBM regardless of the resolution.



Object detection + shape prior segmentation disadvantages

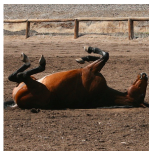
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- In case of object detection problem the bounding box is usually parallel to image sides. It doesn't take into account an object rotation (horse on a hillside)
- The bounding box doesn't have an information about object pose (horse facing left or right).



Part based object detection

[Felzenszwalb P. et al. 2008]

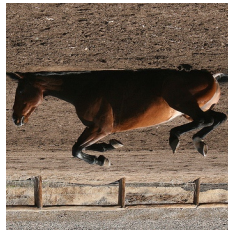
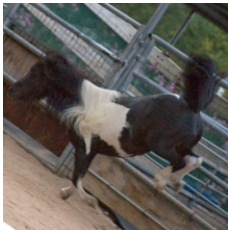
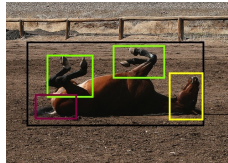
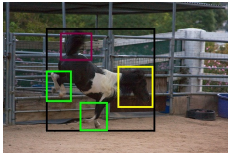
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Part based approach to object detection get the bounding boxes both for whole object and for parts of object (head, croup, legs, etc).



Part based object detection + shape prior segmentation

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The bounding boxes for parts of object allow to determinate an image area for shape prior segmentation. It also gives an information about object.

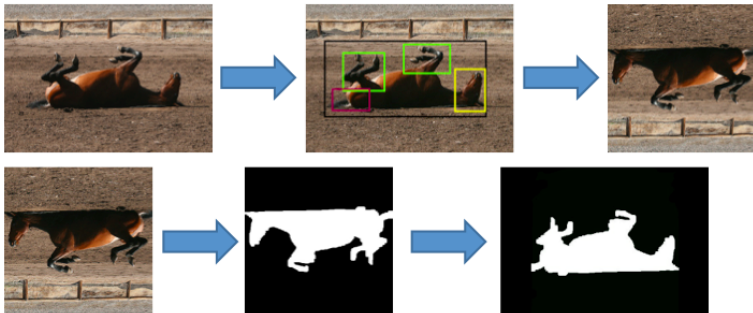


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