Filtered Channel Features for Pedestrian Detection
Supplementary material

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1. Learned model

In figures 1 and 2 we present some qualitative aspects of the final learned models `Checkerboards4x3` and `RandomFilters` (see results section of main paper), not included in the main submission due to space limitations.

In figure 1 we compare the spatial distribution of our models versus a significantly weaker model (`Roerei`, trained on INRIA, see figure 5 of main paper). We observe that our strong models focalize in similar areas than the weak `Roerei` model. This indicates that using filtered channels does not change which areas of the pedestrian are informative, but rather that at the same locations filtered channels are able to extract more discriminative information.

In all three models we observe that diagonal oriented channels focus on left and right shoulders. The `U` colour channel is mainly used around the face, while `L` (luminance) and gradient magnitude ($\|\cdot\|$) channels are used all over the body. Overall head, feet, and upper torso areas provide most clues for detection.

In figure 2 we observe that the filters usage distribution is similar across different filter bank families.

References

[1] R. Benenson, M. Mathias, T. Tuytelaars, and L. Van Gool. Seeking the strongest rigid detector. In *CVPR*, 2013. 2

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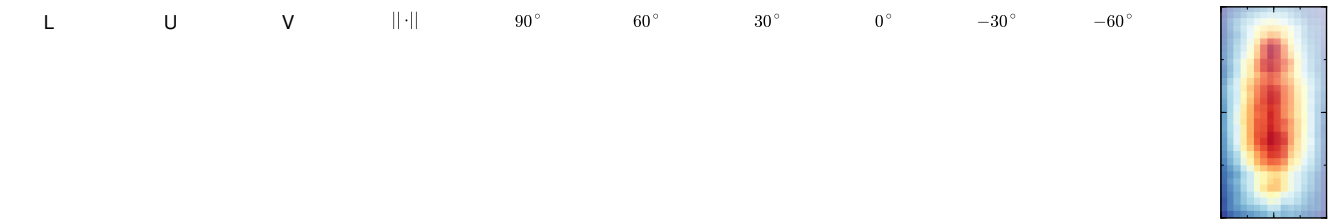
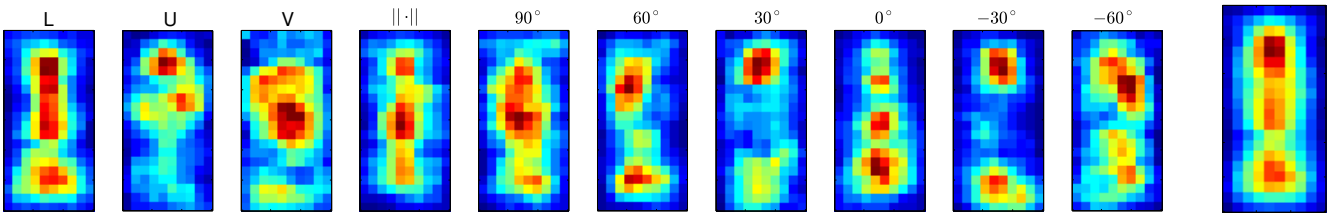
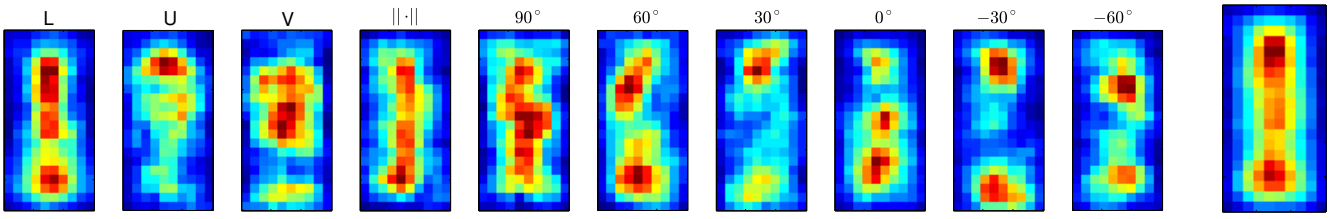


(a) Filters from `Roerei` (scale 1) model. Copied from [1, supplementary material]

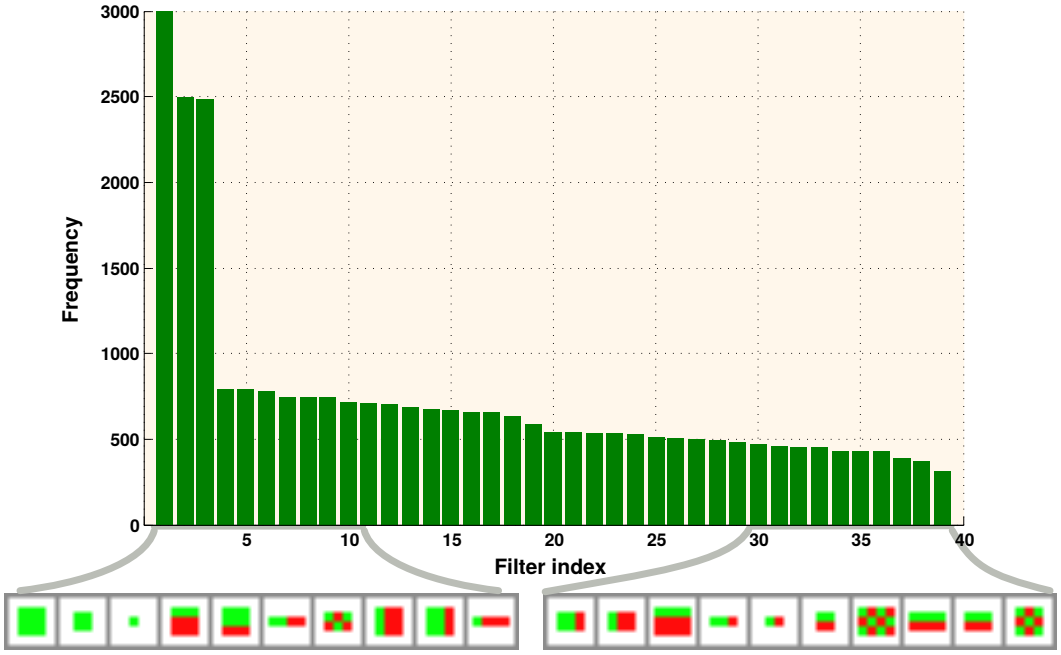


(b) Final `Checkerboards4x3` model

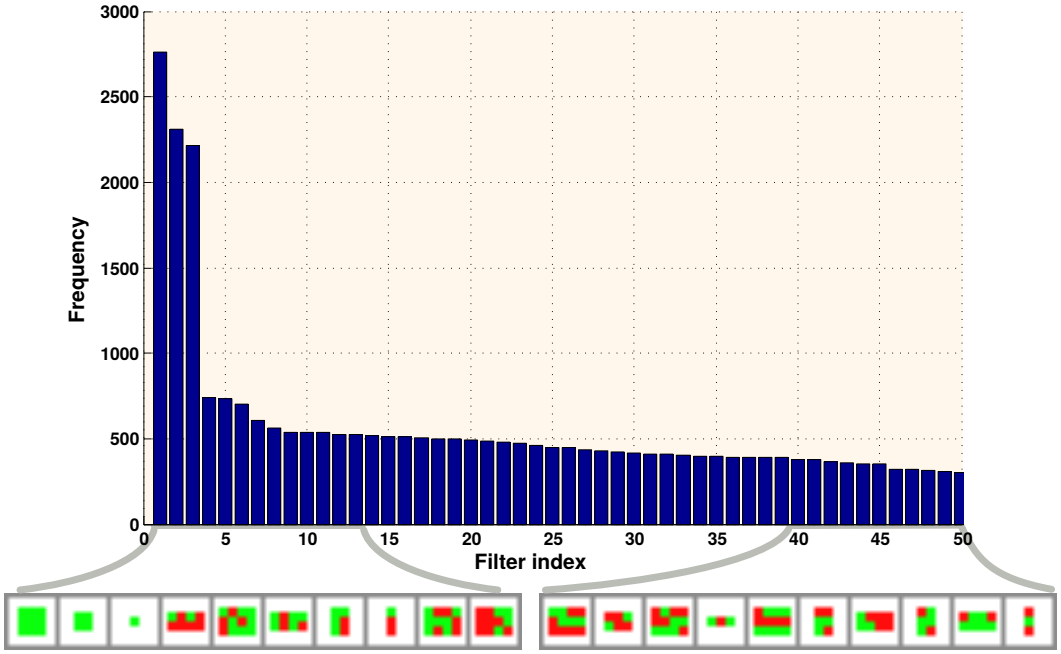


(c) Final `RandomFilters` model

Figure 1: Spatial distribution of learned models. Per channel on the left, and across channels on the right. Red areas indicate pixels that influence most the decision (used by more decision trees). Figures 1b and 1c show our learned models (reach $\sim$18% MR on Caltech test set), figure 1a show a similar visualization for a weaker model ($\sim$46% MR). See text for discussion.



(a) Filters used in our final `Checkerboards4x3` model



(b) Filters used in our final `RandomFilters` model

Figure 2: Frequency of usage of each filter as feature for decision tree split node (independent of the feature channel). Left and right we show the top-10 and bottom-10 most frequent filters respectively.
Uniform filters are clearly the most frequently used ones (also used in methods such as (`Roerei`, `ACF` and `(Squares)ChnFtrs`), there is no obvious ordering pattern in the remaining ones. Please note that each decision tree will probably use multiple filters across multiple channels to reach its weak decision.