

# Caltech Pedestrian Dataset: Evaluated Algorithms

		features	classifier	training	notes
<b>ACF</b>	[18]	channels	AdaBoost	INRIA	evolution of ChnFtrs <a href="#">[source code]</a>
<b>ACF++</b>	[33]	channels	AdaBoost	Caltech	
<b>ACF-Caltech</b>	[18]	channels	AdaBoost	Caltech	evolution of ChnFtrs <a href="#">[source code]</a>
<b>ACF-Caltech+</b>	[32]	channels	AdaBoost	Caltech	uses deeper trees and denser sampling
<b>ACF+SDt</b>	[42]	channels	AdaBoost	Caltech	SDt = Stabilized Dt (motion features)
<b>AFS</b>	[23]	multiple	linear SVM	INRIA	accelerated version of FeatSynth
<b>AFS+Geo</b>	[23]	multiple	linear SVM	INRIA	variant of AFS with geometry constraints
<b>CCF</b>	[55]	deep	AdaBoost	Caltech	
<b>CCF+CF</b>	[55]	deep+channels	AdaBoost	Caltech	
<b>Checkerboards</b>	[60]	channels	AdaBoost	Caltech	
<b>Checkerboards+</b>	[60]	channels	AdaBoost	Caltech	Checkerboards + flow-based features from <a href="#">[42]</a>
<b>ChnFtrs</b>	[17]	channels	AdaBoost	INRIA	updated (see addendum on author website)
<b>CompACT-Deep</b>	[7]	multiple	boosting	Caltech	
<b>ConvNet</b>	[45]	pixels	DeepNet	INRIA	
<b>Crosstalk</b>	[14]	channels	AdaBoost	INRIA	
<b>DBN-Isol</b>	[34]	HOG	DeepNet	INRIA	
<b>DBN-Mut</b>	[37]	HOG	DeepNet	INRIA/Caltech	
<b>DeepCascade</b>	[2]	pixels	DeepNet	Caltech	
<b>DeepCascade+</b>	[2]	pixels	DeepNet	Caltech+	uses Caltech+ETH+Daimler for training
<b>DeepParts</b>	[48]	pixels	DeepNet	Caltech	
<b>FastCF</b>	[12]	channels	AdaBoost	INRIA/Caltech	100 fps on a CPU
<b>F-DNN</b>	[19]	pixels	DeepNet	Caltech+	ImageNet+ETH+TudBrussels data
<b>F-DNN+SS</b>	[19]	pixels	DeepNet	Caltech+	ImageNet+Cityscapes+ETH+TudBrussels data
<b>FeatSynth</b>	[3]	multiple	linear SVM	INRIA	
<b>FisherBoost</b>	[46]	HOG+COV	FisherBoost	INRIA	
<b>FPDW</b>	[15]	channels	AdaBoost	INRIA	accelerated variant of ChnFtrs
<b>FtrMine</b>	[16]	channels	AdaBoost	INRIA	
<b>Franken</b>	[30]	channels	AdaBoost	INRIA	multiple occlusion specific models
<b>HikSvm</b>	[28]	HOG	HIK SVM	INRIA	boundary effect fixed since publication
<b>HOG</b>	[13]	HOG	linear SVM	INRIA	
<b>HOG-LBP</b>	[52]	HOG+LBP	linear SVM	INRIA	
<b>InformedHaar</b>	[59]	channels	AdaBoost	INRIA/Caltech	
<b>JointDeep</b>	[35]	color+gradient	deep net	INRIA/Caltech	
<b>Katamari</b>	[6]	channels	AdaBoost	INRIA/Caltech	combines methods <a href="#">[4, 18, 32, 36, 42]</a>
<b>LatSvm-V1</b>	[20]	HOG	latent SVM	PASCAL	
<b>LatSvm-V2</b>	[21]	HOG	latent SVM	INRIA	
<b>LDCF</b>	[32]	channels	AdaBoost	Caltech	locally decorrelated channel features
<b>LDCF++</b>	[33]	channels	AdaBoost	Caltech	
<b>LFOV</b>	[1]	pixels	DeepNet	Caltech	
<b>MLS</b>	[31]	HOG	AdaBoost	INRIA	
<b>MOCO</b>	[9]	HOG+LBP	latent SVM	Caltech	

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<b>MRFC+Semantic</b>	[11]	channels	boosting	Caltech+	CamVid+SiftFlow+KITTI data for segm.
<b>MS-CNN</b>	[8]	pixels	deep net	Caltech+ImageNet	ImageNet pre-training
<b>MT-DPM</b>	[54]	HOG	latent SVM	Caltech	
<b>MT-DPM+Context</b>	[54]	HOG	latent SVM	Caltech+	context obtained from a vehicle detector
<b>MultiFtr</b>	[53]	multiple	AdaBoost	INRIA	
<b>MultiFtr+CSS</b>	[51]	multiple	linear SVM	TUD-Motion	
<b>MultiFtr+Motion</b>	[51]	multiple	linear SVM	TUD-Motion	
<b>MultiResC</b>	[41]	HOG	latent SVM	Caltech	
<b>MultiSDP</b>	[57]	HOG+CSS	deep net	INRIA/Caltech	
<b>NAMC</b>	[49]	channels	AdaBoost	INRIA/Caltech	
<b>pAUCBoost</b>	[38]	HOG+COV	pAUCBoost	INRIA	optimized for low false-positives
<b>Pls</b>	[44]	multiple	PLS+QDA	INRIA	
<b>PoseInv</b>	[26]	HOG	AdaBoost	INRIA+	trained with annotated silhouettes
<b>PoseInvSvm</b>	[26]	HOG	kernel SVM	INRIA+	trained with annotated silhouettes
<b>RandForest</b>	[29]	HOG+LBP	random forest	INRIA/Caltech	Caltech results include context (CGP)
<b>Roerei</b>	[5]	channels	AdaBoost	INRIA	
<b>RPN+BF</b>	[58]	pixels	DeepNet+AdaBoost	Caltech+ImageNet	ImageNet pre-training
<b>SA-FastRCNN</b>	[24]	pixels	deep net	Caltech+ImageNet	ImageNet pre-training
<b>SCCPriors</b>	[56]	channels	AdaBoost	INRIA/Caltech	
<b>SCF+AlexNet</b>	[22]	pixels	deep net	Caltech+ImageNet	ImageNet pre-training
<b>SDN</b>	[27]	pixels	deep net	INRIA/Caltech	
<b>Shapelet</b>	[43]	gradients	AdaBoost	INRIA	with boundary effects fixed [53]
<b>Shapelet-orig</b>	[43]	gradients	AdaBoost	INRIA	original implementation
<b>SketchTokens</b>	[25]	channels	AdaBoost	INRIA+	Sketch Tokens were trained on BSDS
<b>SpatialPooling</b>	[39]	multiple	pAUCBoost	INRIA/Caltech	spatial pooling + shrinkage to avoid overfitting
<b>SpatialPooling+</b>	[40]	multiple	pAUCBoost	Caltech	improved version of [38, 39] + flow features
<b>TA-CNN</b>	[47]	pixels	DeepNet	Caltech++	augmented with external data
<b>VeryFast</b>	[4]	channels	AdaBoost	INRIA	
<b>VJ</b>	[50]	Haar	AdaBoost	INRIA	implementation from [53]
<b>VJ-OpenCV</b>	[50]	Haar	AdaBoost	INRIA	implementation from OpenCV
<b>WordChannels</b>	[10]	WordChannels	AdaBoost	INRIA/Caltech	
<b>*+2Ped</b>	[36]	HOG	latent SVM	INRIA+	adds 2-person detector as context

## References

- [1] A. Angelova, A. Krizhevsky, V. Vanhoucke  
**Pedestrian Detection with a Large-Field-Of-View Deep Network**  
*ICRA* 2015, Seattle, WA. 1
- [2] A. Angelova, A. Krizhevsky, V. Vanhoucke, A. Ogale, and D. Ferguson  
**Real-Time Pedestrian Detection With Deep Network Cascades**  
*BMVC* 2015, Swansea, UK. 1
- [3] A. Bar-Hillel, D. Levi, E. Krupka, and C. Goldberg  
**Part-based Feature Synthesis for Human Detection**  
*ECCV* 2010, Crete, Greece. 1
- [4] R. Benenson, Mathias M., R. Timofte, and L. Van Gool  
**Pedestrian detection at 100 Frames Per Second**  
*CVPR* 2012, Providence, Rhode Island. 1, 2

- [5] R. Benenson, M. Mathias, T. Tuytelaars and L. Van Gool  
[Seeking the strongest rigid detector](#)  
*CVPR* 2013, Portland, OR. **2**
- [6] R. Benenson, M. Omran, J. Hosang, and B. Schiele  
[Ten years of pedestrian detection, what have we learned?](#)  
*ECCV-CVRSUAD* 2014, Zurich, Switzerland. **1**
- [7] Z. Cai, M. Saberian, and N. Vasconcelos  
[Learning Complexity-Aware Cascades for Deep Pedestrian Detection](#)  
*ICCV* 2015, Santiago, Chile. **1**
- [8] Z. Cai, Q. Fan, R. Feris, and N. Vasconcelos  
[A Unified Multi-scale Deep Convolutional Neural Network for Fast Object Detection](#)  
*ECCV* 2016, Amsterdam, The Netherlands. **2**
- [9] G. Chen, Y. Ding, J. Xiao, and T. Han  
[Detection Evolution with Multi-order Contextual Co-occurrence.](#)  
*CVPR* 2013, Portland, OR. **1**
- [10] A. D. Costea and S. Nedeveschi  
[Word Channel Based Multiscale Pedestrian Detection Without Image Resizing and Using Only One Classifier](#)  
*CVPR* 2014, Columbus, Ohio. **2**
- [11] A. D. Costea and S. Nedeveschi  
[Semantic Channels for Fast Pedestrian Detection](#)  
*CVPR* 2016, Las Vegas, Nevada. **2**
- [12] A. D. Costea, A. Vesa, and S. Nedeveschi  
[Fast Pedestrian Detection for Mobile Devices](#)  
*ITSC* 2015, Canary Islands. **1**
- [13] N. Dalal and B. Triggs  
[Histogram of Oriented Gradient for Human Detection](#)  
*CVPR* 2005, San Diego, California. **1**
- [14] P. Dollár, R. Appel and W. Kienzle  
[Crosstalk Cascades for Frame-Rate Pedestrian Detection](#)  
*ECCV* 2012, Florence Italy. **1**
- [15] P. Dollár, S. Belongie and P. Perona  
[The Fastest Pedestrian Detector in the West](#)  
*BMVC* 2010, Aberystwyth, UK. **1**
- [16] P. Dollár, Z. Tu, H. Tao and S. Belongie  
[Feature Mining for Image Classification](#)  
*CVPR* 2007, Minneapolis, Minnesota. **1**
- [17] P. Dollár, Z. Tu, P. Perona and S. Belongie  
[Integral Channel Features](#)  
*BMVC* 2009, London, England. **1**
- [18] P. Dollár, R. Appel, S. Belongie, and P. Perona  
[Fast Feature Pyramids for Object Detection](#)  
*PAMI*, 2014. **1**

- [19] X. Du, M. El-Khamy, J. Lee, and L. S. Davis  
[Fused DNN: A deep neural network fusion approach to fast and robust pedestrian detection](#)  
*arXiv*, 2016. **1**
- [20] P. Felzenszwalb, D. McAllester, D. Ramanan  
[A Discriminatively Trained, Multiscale, Deformable Part Model](#)  
*CVPR* 2008, Anchorage, Alaska. **1**
- [21] P. Felzenszwalb, R. Girshick, D. McAllester, D. Ramanan  
[Object Detection with Discriminatively Trained Part Based Models](#)  
*PAMI* 2010. **1**
- [22] J. Hosang, M. Omran, R. Benenson, and B. Schiele  
[Taking a Deeper Look at Pedestrians](#)  
*CVPR* 2015, Boston, Massachusetts. **2**
- [23] D. Levi, S. Silberstein, A. Bar-Hillel  
[Fast multiple-part based object detection using KD-Ferns](#)  
*CVPR* 2013, Portland, OR. **1**
- [24] J. Li, X. Liang, S. Shen, T. Xu, and S. Yan  
[Scale-aware Fast R-CNN for Pedestrian Detection](#)  
*arXiv*, 2016. **2**
- [25] J. Lim, C. Lawrence Zitnick, P. Dollár  
[Sketch Tokens: A Learned Mid-level Representation for Contour and Object Detection](#)  
*CVPR* 2013, Portland, OR. **2**
- [26] Z. Lin and L. Davis  
[A Pose-Invariant Descriptor for Human Detection and Segmentation](#)  
*ECCV* 2008, Marseille, France. **2**
- [27] P. Luo, Y. Tian, X. Wang, and X. Tang  
[Switchable Deep Network for Pedestrian Detection](#)  
*CVPR* 2014, Columbus, Ohio. **2**
- [28] S. Maji, A. C. Berg, J. Malik  
[Classification Using Intersection Kernel Support Vector Machines is efficient](#)  
*CVPR* 2008, Anchorage, Alaska. **1**
- [29] J. Marin, D. Vazquez, A. Lopez, J. Amores, B. Leibe  
[Random Forests of Local Experts for Pedestrian Detection](#)  
*ICCV* 2013, Sydney, Australia. **2**
- [30] M. Mathias, R. Benenson, R. Timofte, L. Van Gool  
[Handling Occlusions with Franken-classifiers](#)  
*ICCV* 2013, Sydney, Australia. **1**
- [31] W. Nam, B. Han, and J. H. Han  
[Improving Object Localization Using Macrofeature Layout Selection](#)  
*ICCV Workshop on Visual Surveillance* 2011, Barcelona, Spain. **1**
- [32] W. Nam, P. Dollár, and J. H. Han  
[Local Decorrelation For Improved Pedestrian Detection](#)  
*NIPS* 2014, Montreal, Quebec. **1**

- [33] E. Ohn-Bar and M. Trivedi  
[To Boost or Not to Boost? On the Limits of Boosted Trees for Object Detection](#)  
*ICPR* 2016, Cancun, Mexico. 1
- [34] W. Ouyang and X. Wang  
[A Discriminative Deep Model for Pedestrian Detection with Occlusion Handling](#)  
*CVPR* 2012, Providence, RI. 1
- [35] W. Ouyang and X. Wang  
[Joint Deep Learning for Pedestrian Detection](#)  
*ICCV* 2013, Sydney, Australia. 1
- [36] W. Ouyang and X. Wang  
[Single-pedestrian detection aided by multi-pedestrian detection.](#)  
*CVPR* 2013, Portland, OR. 1, 2
- [37] W. Ouyang, X. Zeng and X. Wang  
[Modeling Mutual Visibility Relationship with a Deep Model in Pedestrian Detection](#)  
*CVPR* 2013, Portland, OR. 1
- [38] S. Paisitkriangkrai, C. Shen, A. van den Hengel  
[Efficient pedestrian detection by directly optimize the partial area under the ROC curve](#)  
*ICCV* 2013, Sydney, Australia. 2
- [39] S. Paisitkriangkrai, C. Shen, A. van den Hengel  
[Strengthening the Effectiveness of Pedestrian Detection](#)  
*ECCV* 2014, Zurich, Switzerland. 2
- [40] S. Paisitkriangkrai, C. Shen, A. van den Hengel  
[Pedestrian Detection with Spatially Pooled Features and Structured Ensemble Learning](#)  
*arXiv*, 2014. 2
- [41] D. Park, D. Ramanan, C. Fowlkes  
[Multiresolution models for object detection](#)  
*ECCV* 2010, Crete, Greece. 2
- [42] D. Park, C. Lawrence Zitnick, D. Ramanan, P. Dollár  
[Exploring Weak Stabilization for Motion Feature Extraction](#)  
*CVPR* 2013, Portland, OR. 1
- [43] P. Sabzmeydani and G. Mori  
[Detecting pedestrians by learning shapelet features](#)  
*CVPR* 2007, Minneapolis, Minnesota. 2
- [44] W.R. Schwartz, A. Kembhavi, D. Harwood, L. S. Davis  
[Human Detection Using Partial Least Squares Analysis](#)  
*ICCV* 2009, Kyoto, Japan. 2
- [45] P. Sermanet, K. Kavukcuoglu, S. Chintala, Y. LeCun  
[Pedestrian Detection with Unsupervised Multi-Stage Feature Learning](#)  
*CVPR* 2013, Portland, OR. 1
- [46] C. Shen, P. Wang, S. Paisitkriangkrai, A. van den Hengel  
[Training Effective Node Classifiers for Cascade Classification](#)  
*IJCV* 2013. 1

- [47] Y. Tian, P. Luo, X. Wang, and X. Tang  
[Pedestrian Detection aided by Deep Learning Semantic Tasks](#)  
*CVPR* 2015, Boston, Massachusetts. **2**
- [48] Y. Tian, P. Luo, X. Wang, and X. Tang  
[Deep Learning Strong Parts for Pedestrian Detection](#)  
*ICCV* 2015, Santiago, Chile. **1**
- [49] C. Toca, M. Ciuc, and C. Patrascu  
[Normalized Autobinomial Markov Channels For Pedestrian Detection](#)  
*BMVC* 2015, Swansea, UK. **2**
- [50] P. Viola and M. Jones  
[Robust Real-Time Face Detection](#)  
*IJCV* 2004. **2**
- [51] S. Walk, N. Majer, K. Schindler, B. Schiele  
[New Features and Insights for Pedestrian Detection](#)  
*CVPR* 2010, San Francisco, California. **2**
- [52] X. Wang, T. X. Han, and S. Yan  
[An HOG-LBP Human Detector with Partial Occlusion Handling](#)  
*ICCV* 2009, Kyoto, Japan. **1**
- [53] C. Wojek and B. Schiele  
[A Performance Evaluation of Single and Multi-Feature People Detection](#)  
*DAGM* 2008, Munich, Germany. **2**
- [54] J. Yan, X. Zhang, Z. Lei, S. Liao, S. Z. Li  
[Robust Multi-Resolution Pedestrian Detection in Traffic Scenes](#)  
*CVPR* 2013, Portland, OR. **2**
- [55] B. Yang, J. Yan, Z. Lei, and S. Z. Li  
[Convolutional Channel Features](#)  
*ICCV* 2015, Santiago, Chile. **1**
- [56] Y. Yang, Z. Wang, and F. Wu  
[Exploring Prior Knowledge for Pedestrian Detection](#)  
*BMVC* 2015, Swansea, UK. **2**
- [57] X. Zeng, W. Ouyang, X. Wang  
[Multi-Stage Contextual Deep Learning for Pedestrian Detection](#)  
*ICCV* 2013, Sydney, Australia. **2**
- [58] L. Zhang, L. Lin, X. Liang, K. He  
[Is Faster R-CNN Doing Well for Pedestrian Detection?](#)  
*ECCV* 2016, Amsterdam, The Netherlands. **2**
- [59] S. Zhang, C. Bauckhage, and A. B. Cremers  
[Informed Haar-like Features Improve Pedestrian Detection](#)  
*CVPR* 2014, Columbus, Ohio. **1**
- [60] S. Zhang, R. Benenson, and B. Schiele  
[Filtered channel features for pedestrian detection](#)  
*CVPR* 2015, Boston, Massachusetts. **1**