

Supplementary material for ADINet: Attribute driven incremental network for retinal
image classification

Anonymous CVPR submission

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Table. 1 Disease labels and semantic attributes in fundus image dataset.

Disease label	Attributes
Normal	central reflux of macula
Age-related macular degeneration-early (AMD (early))	multiple small drusen, extensive intermediate drusen, hemorrhage, macular edema
Age-related macular degeneration- atrophic (AMD (atrophic))	multiple small drusen, hemorrhage, macular edema, geographic atrophy
Age-related macular degeneration-exudative (AMD (exudative))	hemorrhage, macular edema, extensive intermediate drusen
Central serous chorioretinopathy	macular edema, reduced fundus tessellation, intraretinal fluid
Retinao vein occlusion branch (RVO (B))	hemorrhage, vitreous hemorrhage, striate, intraretinal hemorrhage
Retinao vein occlusion central (RVO (C))	hemorrhage, macular hemorrhage, intraretinal hemorrhage
Macular hole	macular hole
Epiretinal membrane	ERM
Non-proliferative diabetic retinopathy	hemorrhage, micro aneurysm
Proliferative diabetic retinopathy	hemorrhage, neovascularization, proliferative tissue
Preperimetric glaucoma	disc change, conus
Glaucoma-early	disc change
Glaucoma-moderate	disc change, enlarged cupping
Glaucoma-severe	disc change, enlarged cupping, pale optic disc
Myopic maculopathy	disc change, macular hole, CRA, tessellated fundus
Myopic choroidal neovascularization	hemorrhage, geographic atrophy, tessellated fundus
Papilledema	disc change, papilledema
Retinitis pigmentosa	macular edema
Non-glaucomatous optic nerve atrophy	disc change

Table 1 shows the disease labels of twenty types of retinal disease and the corresponding attributes. It can be seen that even within the same kind of disease, different levels contain different symptoms that correspond to different attributes. Both of the disease labels and attribute labels are annotated by multiple ophthalmologists. In the disease attribute annotation, there are three kinds of labels: 0 means the absence of this attribute in this disease, 1 means the presence of this attribute in this disease. And there is a particular label of 2, which means this attribute is unrelated to this disease. No matter this attribute appears in this disease or not, it has no contribution to this disease. So when this attribute label equals to 2, this attribute is treated as missing.

Table 2. Attribute recognition comparison on ImageNet150K-sub.

Attribute	Ratio	ResNet50	DeepMAR	ADINet
Black	0.12	57.2	65.2	75.2
Blue	0.0235	66.3	76.1	81.4
Brown	0.0895	62.8	71.6	78.2
Gray	0.0265	61.8	67.7	73.6
Green	0.0315	52.9	65.2	78.9
Orange	0.012	57.3	69.0	73.4
Pink	0.0075	57.4	67.8	72.1
Red	0.0435	59.3	76.2	75.1
Purple	0.003	64.1	81.7	83.2
White	0.111	67.6	78.7	82.3
Yellow	0.03	51.4	54.8	69.5
Colorful	0.029	51.2	56.7	73.8
Spots	0.0655	61.7	71.2	79.8
Stripes	0.033	52.7	62.3	75.6
Rectangular	0.0525	57.2	67.8	77.8
Round	0.0295	52.2	73.2	82.6
Columnar	0.0335	56.2	71.1	68.2
Sharp	0.0185	68.5	78.9	76.7
Metal	0.168	73.2	85.3	87.5
Wooden	0.039	67.9	73.4	76.5
Furry	0.282	64.5	77.8	81.4
Has tail	0.137	63.4	74.3	78.9
Has born	0.0195	51.3	58.7	67.6
Bipedal	0.047	67.8	68.5	70.3
Quadruped	0.1055	66.6	71.1	75.2
Average	*	60.4	70.5	76.6

Table 2 shows the complete attribute recognition results in the ImageNet-150K-sub dataset. It can be seen that by considering the correlations between the attributes, the overall performance is increased. By calculating the weight prediction and integrating them into the attribute prediction, the performance can be boost significantly. Only three attributes have lower performance than the previous method of DeepMAR. Other attribute recognition accuracies and overall performance are higher.

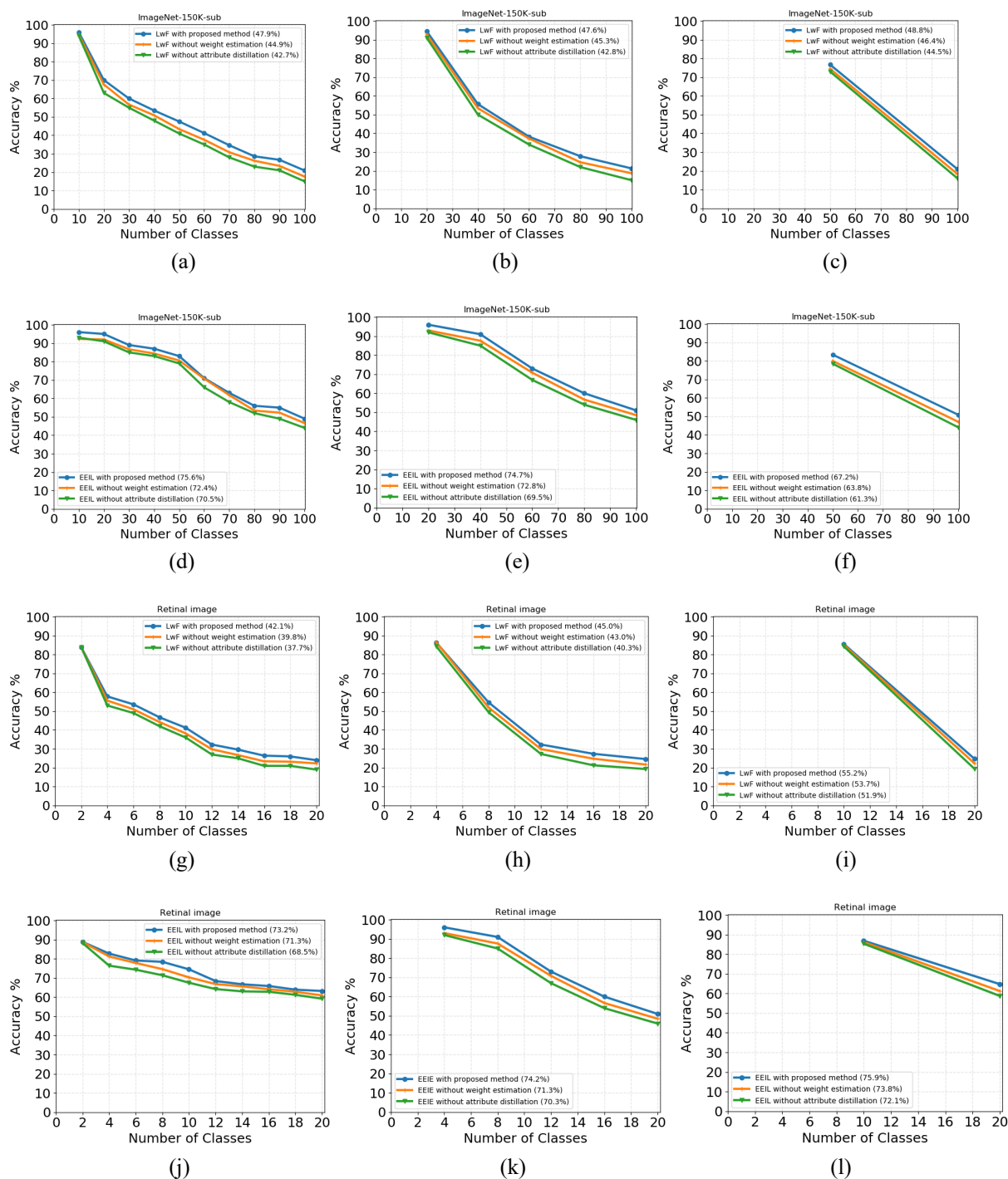


Figure 1. Ablation study of the methods of LwF and EEIL with ImageNet-150K-sub and fundus images.