

**Table 1. Summary of several results for lesion detection/segmentation on IDRiD dataset**

| Reference                             | Backbone  | Loss                           | PR/%         | SE/%         | SP/%        | ACC/%       | AUPR/%      | AUC/%        | F1/%           |
|---------------------------------------|-----------|--------------------------------|--------------|--------------|-------------|-------------|-------------|--------------|----------------|
| Hemorrhage detection/segmentation     |           |                                |              |              |             |             |             |              |                |
| Guo et al. (2019)                     | FCN       | Top-k loss, Bin loss           | -            | -            | -           | -           | -           | <b>67.34</b> | -              |
| Yan et al. (2019a)                    | U-Net     | weighted CE                    | -            | -            | -           | -           | <b>70.3</b> | -            | -              |
| Microaneurysms detection/segmentation |           |                                |              |              |             |             |             |              |                |
| Sarhan et al. (2019)(geometric)       | FCN       | Dice loss, CE and Triplet loss | <b>61.12</b> | 28.07        | -           | -           | 41.96       | -            | <b>38.4877</b> |
| Guo et al. (2019)                     | FCN       | Top-k loss, Bin loss           | -            | -            | -           | -           | -           | <b>46.27</b> | -              |
| Yan et al. (2019a)                    | U-Net     | weighted CE                    | -            | -            | -           | -           | <b>52.5</b> | -            | -              |
| Xue et al. (2019)                     | Mask-RCNN | log regression loss, CE loss   | -            | <b>76.4</b>  | <b>99.8</b> | <b>99.7</b> | -           | -            | -              |
| Hard exudate detection/segmentation   |           |                                |              |              |             |             |             |              |                |
| Guo et al. (2020a)                    | HED       | Top-k loss, Bin loss           | -            | <b>95.74</b> | -           | -           | -           | <b>98.71</b> | <b>95.57</b>   |
| Guo et al. (2019)                     | FCN       | Top-k loss, Bin loss           | -            | -            | -           | -           | -           | 79.45        | -              |
| Yan et al. (2019a)                    | U-Net     | weighted CE                    | -            | -            | -           | -           | <b>88.9</b> | -            | -              |
| Xue et al. (2019)                     | Mask-RCNN | log regression loss, CE loss   | -            | 77.9         | <b>99.6</b> | <b>99.2</b> | -           | -            | -              |
| Soft exudate detection/segmentation   |           |                                |              |              |             |             |             |              |                |
| Guo et al. (2019)                     | FCN       | Top-k loss, Bin loss           | -            | -            | -           | -           | -           | <b>71.13</b> | -              |
| Yan et al. (2019a)                    | U-Net     | weighted CE                    | -            | -            | -           | -           | <b>67.9</b> | -            | -              |

**Table 2. Summary of several results for lesion detection/segmentation on E-optha dataset**

| Reference            | Task              | Backbone  | Loss                 | PR/% | SE/%        | SP/%        | ACC/%       | AUPR/%    | AUC/%        | F1/% |
|----------------------|-------------------|-----------|----------------------|------|-------------|-------------|-------------|-----------|--------------|------|
| Carson et al. (2018) | MA classification | CNN       | -                    | -    | -           | -           | -           | <b>86</b> | <b>94</b>    | -    |
| Guo et al. (2019)    | MA segmentation   | FCN       | Top-k loss, Bin loss | -    | -           | -           | -           | -         | <b>16.87</b> | -    |
| Xue et al. (2019)    | MA segmentation   | Mask-RCNN | log regression       | -    | <b>67.2</b> | <b>99.8</b> | <b>99.7</b> | -         | -            | -    |

|                       |                            |           |                                   |              |              |              |              |           |              |              |
|-----------------------|----------------------------|-----------|-----------------------------------|--------------|--------------|--------------|--------------|-----------|--------------|--------------|
|                       |                            |           | loss and CE<br>loss               |              |              |              |              |           |              |              |
| Carson et al. (2018)  | Exudates classification    | CNN       | -                                 | -            | -            | -            | -            | <b>64</b> | <b>95</b>    | -            |
| Guo et al. (2020a)    | EX detection               | HED       | Top-k loss, Bin loss              | -            | <b>86.44</b> | -            | -            | -         | <b>91.84</b> | <b>87.01</b> |
| Guo et al. (2019)     | EX segmentation            | FCN       | Top-k loss, Bin loss              | -            | -            | -            | -            | -         | 41.71        | -            |
| Xue et al. (2019)     | EX segmentation            | Mask-RCNN | log regression loss and CE loss   | -            | 84.6         | <b>98.8</b>  | <b>98.4</b>  | -         | -            | -            |
| Playout et al. (2019) | Bright Lesion segmentation | U-Net     | loss based on Cohen's coefficient | <b>78.50</b> | <b>80.02</b> | <b>99.88</b> | <b>99.77</b> | -         | -            | <b>79.25</b> |
| Playout et al. (2019) | Red Lesion segmentation    | U-Net     | loss based on Cohen's coefficient | <b>75.26</b> | <b>75.62</b> | <b>99.99</b> | <b>99.88</b> | -         | -            | <b>75.44</b> |

**Table 3. Summary of several results for lesion detection/segmentation on DiaretDB1 dataset**

| Reference             | Task                       | Backbone | Loss                              | PR/%         | SE/%         | SP/%         | ACC/%        | AUC/%       | F1/%         |
|-----------------------|----------------------------|----------|-----------------------------------|--------------|--------------|--------------|--------------|-------------|--------------|
| Dai et al. (2018)     | MA detection               | CNN      | -                                 | <b>99.7</b>  | <b>87.8</b>  | -            | <b>96.1</b>  | <b>93.4</b> | -            |
| Adem (2018)           | Exudate detection          | CNN      | -                                 | -            | <b>99.2</b>  | <b>97.97</b> | -            | -           | -            |
| Playout et al. (2018) | Bright lesion segmentation | U-Net    | loss based on Cohen's coefficient | -            | 75.35        | 99.86        | -            | -           | -            |
| Playout et al. (2019) | Bright lesion segmentation | U-Net    | loss based on Cohen's coefficient | <b>81.70</b> | <b>88.29</b> | <b>99.93</b> | <b>99.89</b> | -           | <b>84.87</b> |
| Playout et al. (2018) | Red lesion segmentation    | U-Net    | loss based on Cohen's coefficient | -            | 66.91        | 99.82        | -            | -           | -            |
| Playout et al. (2019) | Red lesion segmentation    | U-Net    | loss based on Cohen's coefficient | <b>78.96</b> | <b>85.18</b> | <b>99.89</b> | <b>99.83</b> | -           | <b>81.95</b> |

**Table 4. Summary of several results for lesion detection/segmentation on other datasets**

| Reference                  | Task         | Dataset  | Backbone | Loss      | SE/%        | SP/%        | AUC/%       | mAP/%        |
|----------------------------|--------------|----------|----------|-----------|-------------|-------------|-------------|--------------|
| van Grinsven et al. (2016) | HE detection | Kaggle   | CNN      | CE        | <b>83.7</b> | <b>85.1</b> | <b>89.4</b> | -            |
| van Grinsven et al. (2016) | HE detection | Messidor | CNN      | CE        | <b>91.9</b> | <b>91.4</b> | <b>97.2</b> | -            |
| Huang et al. (2020)        | HE           | private  | CNN      | MSE, IoU, | -           | -           | -           | <b>52.20</b> |

|                    | segmentation        |              |                         | GloU                    |              |              |              |   |  |
|--------------------|---------------------|--------------|-------------------------|-------------------------|--------------|--------------|--------------|---|--|
| Yan et al. (2018a) | Drusen segmentation | STARE, DRIVE | Encoder-decoder Network | -                       | <b>92.02</b> | <b>97.30</b> | -            | - |  |
| Adem (2018)        | Exudate detection   | DiaretDB0    | CNN                     | -                       | <b>100</b>   | <b>98.41</b> | -            | - |  |
| Adem (2018)        | Exudate detection   | DrimDB       | CNN                     | -                       | <b>100</b>   | <b>98.44</b> | -            | - |  |
| Tan et al. (2017)  | EX detection        | CLEOPATRA    | CNN                     | log-likelihood function | <b>87.58</b> | <b>98.73</b> | -            | - |  |
| Tan et al. (2017)  | HE detection        | CLEOPATRA    | CNN                     | log-likelihood function | <b>62.57</b> | <b>98.93</b> | -            | - |  |
| Tan et al. (2017)  | MA detection        | CLEOPATRA    | CNN                     | log-likelihood function | <b>46.06</b> | <b>97.99</b> | -            | - |  |
| Guo et al. (2019)  | EX segmentation     | DDR          | FCN                     | Top-k loss, Bin loss    | -            | -            | <b>55.46</b> | - |  |
| Guo et al. (2019)  | SE segmentation     | DDR          | FCN                     | Top-k loss, Bin loss    | -            | -            | <b>26.48</b> | - |  |
| Guo et al. (2019)  | HE segmentation     | DDR          | FCN                     | Top-k loss, Bin loss    | -            | -            | <b>35.86</b> | - |  |
| Guo et al. (2019)  | MA segmentation     | DDR          | FCN                     | Top-k loss, Bin loss    | -            | -            | <b>10.52</b> | - |  |

**Table 5. Summary of several results for vessel segmentation on DRIVE dataset**

| Reference                    | Backbone | Loss                        | SE/%         | SP/%  | ACC/% | AUC/% | F1/%  |
|------------------------------|----------|-----------------------------|--------------|-------|-------|-------|-------|
| Khalaf et al. (2016)         | CNN      | -                           | 83.97        | 95.62 | 94.56 | -     | -     |
| Liskowski and Krawiec (2016) | CNN      | CE                          | <b>91.60</b> | 92.41 | 92.30 | 97.38 | -     |
| Yu et al. (2020)             | CNN      | -                           | 76.43        | 98.03 | 95.24 | 97.23 | -     |
| Fu et al. (2016)             | FCN      | CBCE                        | 76.03        | -     | 95.23 | -     | -     |
| Dasgupta and Singh (2017)    | FCN      | CE                          | 76.91        | 98.01 | 95.33 | 97.44 | -     |
| Feng et al. (2017)           | FCN      | CBCE                        | 78.11        | 98.39 | 95.60 | 97.92 | -     |
| Oliveira et al. (2018)       | FCN      | categorical CE              | 80.39        | 98.04 | 95.76 | 98.21 | -     |
| Zhang and Chung (2018)       | U-Net    | CE                          | 87.23        | 96.18 | 95.04 | 97.99 | -     |
| He et al. (2018)             | U-Net    | Focal loss                  | 77.61        | 97.92 | 95.19 | -     | 81.29 |
| Yan et al. (2018b)           | U-Net    | Proposed segment-level loss | 76.53        | 98.18 | 95.42 | 97.52 | -     |
| Yan et al. (2019b)           | U-Net    | CE                          | 76.31        | 98.20 | 95.38 | 97.50 | -     |
| Wu et al. (2018)             | U-Net    | CE                          | 78.44        | 98.19 | 95.67 | 98.07 | -     |
| Wu et al. (2020)             | U-Net    | CE                          | 79.96        | 98.13 | 95.82 | 98.30 | -     |
| Wang et al. (2020)           | U-Net    | CE                          | 78.49        | 98.13 | 95.67 | 97.88 | 82.41 |

|   |                  |                                       |       |              |              |              |              |
|---|------------------|---------------------------------------|-------|--------------|--------------|--------------|--------------|
| Hu et al. (2018)                          | FCN              | improved CE                           | 77.72 | 97.93        | 95.33        | 97.59        | -            |
| Wu et al. (2019)                          | U-Net            | CE                                    | 80.38 | 98.02        | 95.78        | 98.21        | -            |
| Soomro et al. (2019)                      | SegNet           | CBCE                                  | 87    | 98.5         | 95.6         | 98.6         | -            |
| Zhang et al. (2019a)                      | U-Net            | -                                     | 81.00 | 98.48        | 96.92        | 98.56        | -            |
| Wang et al. (2019a)                       | U-Net            | CE and Jaccard loss                   | 79.40 | 98.16        | 95.67        | 97.72        | <b>82.70</b> |
| Ma et al. (2019)                          | U-Net            | CE                                    | 79.16 | 98.11        | 95.70        | 98.10        | -            |
| Zhao et al. (2020a)                       | Dense U-Net      | global pixel loss, local matting loss | 83.29 | 97.67        | -            | -            | 82.29        |
| Mishra et al. (2020)                      | U-Net            | CE                                    | 89.16 | 96.01        | 95.40        | 97.24        | -            |
| Feng et al. (2020)                        | FCN              | MSE                                   | 76.25 | 98.09        | 95.28        | 96.78        | -            |
| Cherukuri et al. (2020)                   | Residual FCN     | MSE                                   | 84.25 | <b>98.49</b> | <b>97.23</b> | <b>98.70</b> | -            |
| Kromm and Rohr (2020)                     | CapsNet          | margin loss                           | 76.51 | 98.18        | 95.47        | 97.50        | -            |
| Liu et al. (2019a)                        | No-reference net | MSE                                   | 80.72 | 97.80        | 95.59        | 97.79        | 82.25        |
| <a href="#">Wang et al. (MICCAI2020)</a>  | U-Net            |                                       | 81.07 | 98.45        | 96.81        | 98.17        | -            |
| <a href="#">Xu et al.(MICCAI2020)</a>     | U-Net            | CE                                    | 91.2  | 94.7         | -            | 98.1         | -            |
| <a href="#">Zhang et al. (MICCAI2020)</a> | U-Net            | -                                     | 82.15 | 98.45        | 97.01        | 98.67        | 82.67        |

**Table 6. Summary of several results for vessel segmentation on STARE dataset**

| Reference                    | Backbone     | Loss                        | SE/%  | SP/%         | ACC/%        | AUC/%        | F1/%         |
|------------------------------|--------------|-----------------------------|-------|--------------|--------------|--------------|--------------|
| Liskowski and Krawiec (2016) | CNN          | CE                          | 93.07 | 93.04        | 93.09        | 98.20        | -            |
| Yu et al. (2020)             | CNN          | -                           | 78.37 | 98.22        | 96.13        | 97.87        | -            |
| Fu et al. (2016)             | FCN          | CBCE                        | 74.12 | -            | 95.85        | -            | -            |
| Oliveira et al. (2018)       | FCN          | categorical CE              | 83.15 | 98.58        | 96.94        | 99.05        | -            |
| Zhang and Chung (2018)       | U-Net        | CE                          | 76.73 | 99.01        | 97.12        | 98.82        | -            |
| He et al. (2018)             | U-Net        | Focal loss                  | 81.20 | 98.95        | 97.04        | -            | 85.53        |
| Yan et al. (2018b)           | U-Net        | Proposed segment-level loss | 75.81 | 98.46        | 96.12        | 98.01        | -            |
| Yan et al. (2019b)           | U-Net        | CE                          | 77.35 | 98.57        | 96.38        | 98.33        | -            |
| Wu et al. (2020)             | U-Net        | CE                          | 79.63 | 98.63        | 96.72        | 98.75        | -            |
| Wang et al. (2020)           | U-Net        | CE                          | 90.24 | <b>99.34</b> | <b>98.49</b> | <b>99.60</b> | <b>91.84</b> |
| Hu et al. (2018)             | FCN          | improved CE                 | 75.43 | 98.14        | 96.32        | 97.51        | -            |
| Feng et al. (2020)           | FCN          | MSE                         | 77.09 | 98.48        | 96.33        | 97           | -            |
| Soomro et al. (2019)         | SegNet       | CBCE                        | 84.8  | 98.6         | 96.8         | 98.8         | -            |
| Cherukuri et al. (2020)      | Residual FCN | MSE                         | 86.64 | 98.95        | 98.03        | 99.35        | -            |

|                                       |                  |                                       |       |       |       |       |       |
|---------------------------------------|------------------|---------------------------------------|-------|-------|-------|-------|-------|
| Zhao et al. (2020a)                   | Dense U-Net      | global pixel loss, local matting loss | 84.33 | 98.57 | -     | -     | 83.51 |
| Mishra et al. (2020)                  | U-Net            | CE                                    | 87.71 | 96.34 | 95.71 | 97.42 | -     |
| Liu et al. (2019a)                    | No-reference net | MSE                                   | 77.71 | 98.43 | 96.23 | 97.93 | 80.36 |
| <a href="#">Xu et al.(MICCAI2020)</a> | U-Net            | CE                                    | 92.8  | 95.4  | -     | 98.6  | -     |

**Table 7. Summary of several results for vessel segmentation on CHASE DB1 dataset**

| Reference                                | Backbone         | Loss                        | SE/%        | SP/%         | ACC/%        | AUC/%        | F1/%         |
|--|------------------|-----------------------------|-------------|--------------|--------------|--------------|--------------|
| Fu et al. (2016)                         | FCN              | CBCE                        | 71.30       | -            | 94.89        | -            | -            |
| Oliveira et al. (2018)                   | FCN              | categorical CE              | 77.79       | 98.64        | 96.53        | 98.55        | -            |
| Zhang and Chung (2018)                   | U-Net            | CE                          | 76.70       | <b>99.09</b> | 97.70        | 99.00        | -            |
| Yan et al. (2018b)                       | U-Net            | Proposed segment-level loss | 76.33       | 98.09        | 96.10        | 97.81        | -            |
| Yan et al. (2019b)                       | U-Net            | CE                          | 76.41       | 98.06        | 96.07        | 97.76        | -            |
| Wu et al. (2018)                         | U-Net            | CE                          | 75.38       | 98.47        | 96.37        | 98.25        | -            |
| Wu et al. (2020)                         | U-Net            | CE                          | 80.03       | 98.80        | 96.88        | 98.94        | -            |
| Wang et al. (2020)                       | U-Net            | CE                          | 79.48       | 98.42        | 96.48        | 98.47        | 82.20        |
| Wu et al. (2019)                         | U-Net            | CE                          | 81.32       | 98.14        | 96.61        | 98.60        | -            |
| Soomro et al. (2019)                     | SegNet           | CBCE                        | <b>88.6</b> | 98.2         | 97.6         | 98.5         | -            |
| Zhang et al. (2019a)                     | U-Net            | -                           | 81.86       | 98.48        | 97.43        | 98.63        | -            |
| Cherukuri et al. (2020)                  | Residual FCN     | MSE                         | 80.17       | 99.08        | <b>97.88</b> | 98.64        | -            |
| Wang et al. (2019a)                      | U-Net            | CE and Jaccard loss         | 80.74       | 98.21        | 96.61        | 98.12        | 80.37        |
| Mishra et al. (2020)                     | U-Net            | CE                          | 88.05       | 96.51        | 96.01        | 97.63        | -            |
| Liu et al. (2019a)                       | No-reference net | MSE                         | 87.69       | 98.43        | 97.42        | <b>99.05</b> | <b>85.98</b> |
| <a href="#">Wang et al. (MICCAI2020)</a> | U-Net            | -                           | 80.69       | 98.36        | 97.26        | 98.33        | -            |
| <a href="#">Xu et al. (MICCAI2020)</a>   | U-Net            | CE                          | 92.3        | 95.4         | -            | 98.5         | -            |

**Table 8. Summary of several results for vessel segmentation on HRF dataset**

| Reference            | Backbone    | Loss                                  | SE/%        | SP/%         | ACC/%       | AUC/%       | F1/%         |
|----------------------|-------------|---------------------------------------|-------------|--------------|-------------|-------------|--------------|
| Soomro et al. (2019) | SegNet      | CBCE                                  | <b>82.9</b> | 96.1         | <b>96.2</b> | <b>98.5</b> | -            |
| Zhao et al. (2020a)  | Dense U-Net | global pixel loss, local matting loss | 78.09       | <b>98.18</b> | -           | -           | <b>78.13</b> |

**Table 9. Summary of several results for OD/OC segmentation on Drishiti-GS dataset**

| Reference                     | Backbone            | Loss  | OD        |           | OC          |           | $\delta$     |
|-------------------------------|---------------------|---|-----------|-----------|-------------|-----------|--------------|
|                               |                     |   | Dice/%    | IoU/%     | Dice/%      | IoU/%     |              |
| Edupuganti et al. (2018)      | FCN                 | weighted CE   | -         | 69.58     | -           | 81.22     | -            |
| Mohan et al. (2018)           | FCN                 | bootstrapped CE and Dice loss                               | 96.4      | -         | -           | -         | -            |
| Mohan et al. (2019)           | FCN                 | bootstrapped CE and Dice loss                               | 97.13     | -         | -           | -         | -            |
| Liu et al. (2019e)            | FCN                 | spatial-aware error function                                | <b>98</b> | -         | 89          | -         | -            |
| Shankaranarayana et al.(2019) | Encoder-decoder net | multi-class CE  | 96.3      | -         | 84.8        | -         | 0.1045       |
| Shah et al. (2019) (PSBN)     | U-Net               | logarithmic dice loss                                       | 95        | 91        | 88          | <b>80</b> | -            |
| Shah et al. (2019)(WRoIM)     | U-Net               | logarithmic dice loss                                       | 96        | <b>93</b> | 89          | <b>80</b> | -            |
| Wang et al. (2019c)           | Deeplab, GAN        | dice coefficient loss, smoothness loss and adversarial loss | 97.4      | -         | <b>90.1</b> | -         | <b>0.048</b> |
| Wang et al. (2019b)           | DeeplabV3+, GAN     | CE, MSE, Adversarial loss                                   | 96.1      | -         | 86.2        | -         | -            |

**Table 10. Summary of several results for OD/OC segmentation on ORIGA dataset**

| Reference                     | Backbone            | Loss                         | OD          |              | OC          |              | Rim         |              | $\delta$     |
|-------------------------------|---------------------|------------------------------|-------------|--------------|-------------|--------------|-------------|--------------|--------------|
|                               |                     |                              | A/%         | E            | A/%         | E            | A/%         | E            |              |
| Liu et al. (2019e)            | FCN                 | spatial-aware error function | -           | 0.059        | -           | <b>0.208</b> | -           | <b>0.215</b> | -            |
| Fu et al. (2018a)             | U-Net               | proposed multi-label loss    | 98.3        | 0.071        | 93.0        | 0.230        | 94.1        | 0.233        | 0.071        |
| Shankaranarayana et al.(2019) | Encoder-decoder net | multi-class CE               | 97.4        | <b>0.051</b> | 92.8        | 0.212        | -           | -            | 0.067        |
| Yin et al. (2019)             | RPN                 | Multi-label CE               | <b>98.6</b> | 0.066        | <b>94.2</b> | <b>0.208</b> | <b>94.9</b> | 0.224        | <b>0.065</b> |
| Jiang et al. (2020)           | atrous CNN and RPN  | Smooth L1 loss and BCE       | -           | 0.063        | -           | 0.209        | -           | -            | 0.068        |

**Table 11. Summary of several results for OD/OC segmentation on RIM-ONE-r3 dataset**

| Reference                      | Backbone            | Loss                  | OD          |              |             |           | OC          |              |             |           | $\delta$     |
|--------------------------------|---------------------|-----------------------|-------------|--------------|-------------|-----------|-------------|--------------|-------------|-----------|--------------|
|                                |                     |                       | A/%         | E            | Dice/%      | IoU/%     | A/%         | E            | Dice/%      | IoU/%     |              |
| Shankaranarayana et al. (2019) | Encoder-decoder net | multi-class CE        | <b>97.5</b> | <b>0.058</b> | <b>97.0</b> | -         | <b>92.0</b> | <b>0.284</b> | <b>87.6</b> | -         | 0.066        |
| Shah et al. (2019)(PSBN)       | U-Net               | logarithmic dice loss | -           | -            | 91          | 84        | -           | -            | 75          | 60        | -            |
| Shah et al. (2019)(WRoIM)      | U-Net               | logarithmic dice loss | -           | -            | 94          | <b>90</b> | -           | -            | 82          | <b>71</b> | -            |
| Wang et                        | Deeplab,            | dice coefficient      | -           | -            | 96.8        | -         | -           | -            | 85.6        | -         | <b>0.049</b> |

|                        |                     |   |   |   |      |   |   |   |      |   |   |  |
|------------------------|---------------------|---|---|---|------|---|---|---|------|---|---|--|
| al.(2019c)             | GAN                 | loss, smoothness<br>loss, adversarial<br>loss |   |   |      |   |   |   |      |   |   |  |
| Wang et al.<br>(2019b) | DeeplabV3<br>+, GAN | CE, MSE, Adversarial loss                     | - | - | 89.8 | - | - | - | 81.0 | - | - |  |

**Table 12. Summary of several results for OD/OC segmentation on REFUGE dataset**

| Reference              | Backbone     | Loss  | OD          |              |              | OC          |              |              | Rim         |              | $\delta$      |
|------------------------|--------------|---|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|---------------|
|                        |              |   | A/%         | E            | Dice/%       | A/%         | E            | Dice/%       | A/%         | E            |               |
| Wang et al.<br>(2019f) | RPN          | Weighted CE, regression loss                                | -           | -            | 95.3         | -           | -            | 87.2         | -           | -            | 0.047         |
| Yin et al.<br>(2019)   | RPN          | Multi-label CE  | <b>97.9</b> | <b>0.088</b> | -            | <b>98.0</b> | <b>0.223</b> | -            | <b>93.6</b> | <b>0.204</b> | 0.048         |
| Wang et al.<br>(2019c) | Deeplab, GAN | dice coefficient loss, smoothness loss and adversarial loss | -           | -            | <b>96.02</b> | -           | -            | <b>88.26</b> | -           | -            | <b>0.0450</b> |
| Liu et al.<br>(2019d)  | GAN          | dice segmentation loss, adversarial loss and MSE loss       | -           | -            | 94.16        | -           | -            | 86.27        | -           | -            | 0.0481        |

**Table 13. Summary of several results for OD/OC segmentation on other datasets**

| Reference               | Dataset  | Backbone        | Loss                        | OD           |             | OC           |        | $\delta$     |
|-------------------------|----------|-----------------|-----------------------------|--------------|-------------|--------------|--------|--------------|
|                         |          |                 |                             | E            | Dice/%      | E            | Dice/% |              |
| Mohan et al.<br>(2018)  | DrionsDB | FCN             | bootstrapped CE, Dice loss  | -            | 95.5        | -            | -      | -            |
| Mohan et al.<br>(2019)  | DrionsDB | FCN             | bootstrapped CE, Dice loss  | -            | <b>96.6</b> | -            | -      | -            |
| Mohan et al.<br>(2018)  | MESSIDOR | FCN             | bootstrapped CE, Dice loss  | -            | 95.7        | -            | -      | -            |
| Mohan et al.<br>(2019)  | MESSIDOR | FCN             | bootstrapped CE, Dice loss  | -            | <b>96.8</b> | -            | -      | -            |
| Jiang et al.<br>(2020)  | SCES     | atrous CNN, RPN | Smooth L1 loss, BCE         | <b>0.063</b> | -           | <b>0.209</b> | -      | <b>0.068</b> |
| Sedai et al.<br>(2017a) | EyePACS  | VAE             | negative KL-divergence, BCE | -            | -           | -            | -      | <b>0.80</b>  |

**Table 14. Summary of several results for DR diagnosis/grading**

| Reference              | Dataset    | Category | Backbone     | Loss                   | SE/%        | SP/%        | AUC/%       | Kappa/% |
|------------------------|------------|----------|--------------|------------------------|-------------|-------------|-------------|---------|
| David et al. (2016)    | Messidor-2 | 4        | CNN          | -                      | <b>96.8</b> | <b>87.0</b> | <b>98.0</b> | -       |
| Gulshan et al. (2016)  | Messidor-2 | 2        | Inception-v3 | -                      | 87.0        | <b>98.5</b> | <b>99.0</b> | -       |
| Gargeya and Leng(2017) | Messidor-2 | 2        | CNN          | 2-class categorical CE | <b>93</b>   | 87          | 94          | -       |
| Wang et al. (2017)     | Messidor   | 5        | CNN          | -                      | -           | -           | 95.7        | -       |
| Lin et al. (2018)      | Messidor   | 5        | CNN          | -                      | -           | -           | <b>96.8</b> | -       |

|   |                      |                               |                 |                           |             |             |              |                  |
|---|----------------------|-------------------------------|-----------------|---------------------------|-------------|-------------|--------------|------------------|
| Gulshan et al. (2016)                       | EyePACS              | 2                             | Inception-v3    | -                         | 90.3        | <b>98.1</b> | <b>99.1</b>  | -                |
| Gargeya and Leng(2017)                      | EyePACS              | 2                             | CNN             | 2-class<br>categorical CE | <b>94</b>   | 98          | 97           | -                |
| Gargeya and Leng(2017)                      | E-Ophtha             | 2                             | CNN             | 2-class<br>categorical CE | <b>90</b>   | <b>94</b>   | <b>95</b>    | -                |
| Quellec et al. (2017)                       | E-Ophtha             | 2                             | CNN             | -                         | -           | -           | 94.9         | -                |
| Wang et al. (2017)                          | Kaggle               | 5                             | CNN             | -                         | -           | -           | 85.4         | -                |
| Lin et al. (2018)                           | Kaggle               | 5                             | CNN             | -                         | -           | -           | -            | 85.9             |
| Roy et al. (2017)                           | Kaggle               | 5                             | CNN             | -                         | -           | -           | -            | <b>86</b>        |
| Yang et al. (2017)                          | Kaggle               | 4                             | CNN             | -                         | -           | -           | <b>95.90</b> | -                |
| Quellec et al. (2017)                       | Kaggle               | 2                             | CNN             | -                         | -           | -           | 95.5         | -                |
| <a href="#">Galdran et al. (MICCAI2020)</a> | Kaggle               | 5                             | CNN             | proposed                  | -           | -           | -            | 78.71 $\pm$ 0.28 |
| <a href="#">Liu et al.(MICCAI2020)</a>      | Kaggle               | -                             | CNN+GCN         | -                         | -           | -           | -            | <b>72.7</b>      |
| Gondal et al. (2017)                        | DiaretDB1            | 2                             | CNN             | -                         | <b>93.6</b> | <b>97.6</b> | <b>95.4</b>  | -                |
| Foo et al. (2020)                           | SiDRP14-15           | 5(No here)                    | DR U-Net, VGG16 | binary CE                 | -           | -           | <b>78.56</b> | -                |
| Foo et al. (2020)                           | IDRiD                | 5(No here)                    | DR U-Net, VGG16 | binary CE                 | -           | -           | <b>99.00</b> | -                |
| Lin et al. (2018)                           | private              | 5                             | CNN             | -                         | -           | -           | -            | <b>87.5</b>      |
| Krause et al. (2017)                        | private              | 5 (moderate or worse DR here) | Inception-v4    | -                         | <b>97.1</b> | <b>92.3</b> | <b>98.6</b>  | <b>84</b>        |
| Li et al. (2018b)                           | private              | 2                             | Inception-v3    | -                         | <b>92.5</b> | <b>98.5</b> | <b>95.5</b>  | -                |
| Zhang et al. (2019b)                        | private              | 2                             | CNN             | CE                        | <b>97.5</b> | <b>97.7</b> | <b>97.7</b>  | -                |
| Zhang et al. (2019b)                        | private              | 4                             | CNN             | CE                        | <b>98.1</b> | <b>98.9</b> | -            | -                |
| Gulshan et al. (2019)                       | hospital in Sankara  | 2                             | CNN             | -                         | <b>92.1</b> | <b>95.2</b> | <b>98.0</b>  | -                |
| Gulshan et al. (2019)                       | hospitals in Aravind | 2                             | CNN             | -                         | <b>88.9</b> | <b>92.2</b> | <b>96.3</b>  | -                |
| <a href="#">Liu et al.(MICCAI2020)</a>      | APTOS2019            | -                             | CNN+GCN         | -                         | -           | -           | -            | <b>91.2</b>      |

**Table 15. Summary of several results for glaucoma diagnosis/grading**

| Reference                           | Dataset             | Backbone   | Loss                            | SE/%       | SP/%       | ACC/%      | BACC/% | AUC/%      |
|-------------------------------------|---------------------|------------|---------------------------------|------------|------------|------------|--------|------------|
| Li et al. (2019a)/Li et al. (2020b) | RIM-ONE             | CNN        | K-L divergence function and CE  | 84.8       | 85.5       | 85.2       | -      | 91.6       |
| dos Santos Ferreira et al. (2018)   | RIM-ONE, DRISHTI-GS | U-Net, CNN | -                               | <b>100</b> | <b>100</b> | <b>100</b> | -      | <b>100</b> |
| Zhao et al. (2019d)                 | ORIGA               | CNN        | contrastive loss and hinge loss | -          | --         | -          | -      | <b>92</b>  |
| Liao et al. (2020)                  | ORIGA               | CNN        | -                               | -          | -          | --         | -      | 88         |



|  |              |                         |                                |              |              |              |              |              |
|--|--------------|-------------------------|--------------------------------|--------------|--------------|--------------|--------------|--------------|
| Li et al. (2019a)                      | LAG          | CNN                     | K-L divergence function and CE | 95.4         | 95.2         | 95.3         | -            | 97.5         |
| Li et al. (2020b)                      | LAG          | CNN                     | K-L divergence function and CE | 95.4         | <b>96.7</b>  | <b>96.2</b>  | -            | 98.3         |
| <a href="#">Wu et al. (MICCAI2020)</a> | LAG          | Teacher-student net     | BCE                            | <b>98.72</b> | 94.75        | 96.04        | -            | <b>99.51</b> |
| Pal et al. (2018)                      | DRIONS-DB    | Encoder-decoder network | Reconstruction loss and CE     | -            | -            | -            | -            | <b>92.3</b>  |
| Fu et al. (2018b)                      | SCES         | U-Net, ResNet50         | Dice coefficient loss and CE   | <b>84.78</b> | <b>83.80</b> | -            | <b>84.29</b> | <b>91.83</b> |
| Fu et al. (2018b)                      | SINDI        | U-Net, ResNet50         | Dice coefficient loss and CE   | <b>78.76</b> | <b>71.15</b> | -            | <b>74.95</b> | <b>81.73</b> |
| Raghavendra et al.(2018)               | Private      | CNN                     | -                              | <b>98.00</b> | <b>98.30</b> | <b>98.13</b> | -            | -            |
| Li et al. (2018a)                      | Private      | Inception-v3            | -                              | <b>95.6</b>  | <b>92.0</b>  | -            | -            | <b>98.6</b>  |
| Phene et al. (2019)                    | Private      | Inception-v3            | -                              | -            | -            | -            | -            | <b>94.5</b>  |
| Chai et al. (2018)                     | Private      | FCN, CNN, Faster-RCNN   | CE                             | <b>92.33</b> | <b>90.90</b> | <b>91.51</b> | -            | -            |
| Liu et al. (2019c)                     | Private FIGD | ResNet                  | CE                             | <b>96.2</b>  | <b>97.7</b>  | -            | -            | <b>99.6</b>  |
| <a href="#">Wu et al. (MICCAI2020)</a> | RIGA         | Teacher-student net     | BCE                            | <b>96.03</b> | <b>91.42</b> | <b>93.29</b> | -            | <b>98.29</b> |
| <a href="#">Yu et al. (MICCAI2020)</a> | DRISHTI      | CNN                     | CE, KL loss                    | <b>91.43</b> | <b>74.19</b> | <b>86.14</b> | -            | <b>89.63</b> |
| <a href="#">Li et al. (MICCAI2020)</a> | SIGF         | CNN+LSTM                | -                              | <b>85.7</b>  | <b>80.6</b>  | <b>80.7</b>  | -            | <b>87.0</b>  |

**Table 16. Summary of several results for AMD diagnosis/grading**

| Reference                | Dataset | Backbone     | Loss            | Category   | SE/%        | SP/%        | ACC/%       | AUC/%        | Kappa/%     |
|--------------------------|---------|--------------|-----------------|------------|-------------|-------------|-------------|--------------|-------------|
| Burlina et al. (2016)    | AREDS   | CNN with SVM | -               | 2(1vs.3,4) | <b>93.4</b> | <b>95.6</b> | <b>95.0</b> | -            | -           |
| Burlina et al. (2017)    | AREDS   | CNN with SVM | -               | 2          | -           | -           | 88.4~91.6   | <b>94~96</b> | -           |
| Horta et al. (2017)      | AREDS   | CNN with RF  | -               | 2          | 66.34       | 88.95       | 79.04       | 84.76        | -           |
| Govindaiah et al. (2018) | AREDS   | CNN          | -               | 2          | -           | -           | 92.5        | -            | -           |
| Govindaiah et al. (2018) | AREDS   | CNN          | -               | -          | -           | -           | <b>83</b>   | -            | -           |
| Burlina et al. (2018)    | AREDS   | ResNet50     | Regression loss | 4          | -           | -           | <b>75.7</b> | -            | -           |
| Peng et al. (2018)       | AREDS   | Inception-v3 | -               | 6          | <b>59.0</b> | <b>93.0</b> | <b>67.1</b> | -            | <b>55.8</b> |
| Burlina et al.           | AREDS   | ResNet50     | Regression      | 9          | -           | -           | <b>59.1</b> | -            | -           |

|                         |             |     |                   |      |              |              |              |   |   |  |
|-------------------------|-------------|-----|-------------------|------|--------------|--------------|--------------|---|---|--|
| (2018)                  |             |     |                   | loss |              |              |              |   |   |  |
| Grassmann et al. (2018) | AREDS, KORA | CNN | weighted k metric | 13   | -            | -            | <b>63.3</b>  | - | - |  |
| Tan et al. (2018)       | Collected   | CNN | -                 | 2    | <b>96.43</b> | <b>93.75</b> | <b>95.45</b> | - | - |  |