|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| gen | eval | f\_opt | f\_max | f\_avg | f\_min | f\_std |
| 0 | 50 | 0.974542 | 0.974542 | 0.669073 | 0.625275 | 0.105095 |
| 1 | 100 | 0.974542 | 0.96978 | 0.699857 | 0.625275 | 0.130396 |
| 2 | 150 | 0.974725 | 0.974725 | 0.753538 | 0.625275 | 0.156165 |
| 3 | 200 | 0.974725 | 0.974725 | 0.834319 | 0.625275 | 0.152626 |
| 4 | 250 | 0.974725 | 0.974725 | 0.945319 | 0.796154 | 0.0318183 |
| 5 | 300 | 0.974725 | 0.974725 | 0.951084 | 0.873993 | 0.0222437 |
| 6 | 350 | 0.974725 | 0.974725 | 0.942344 | 0.625275 | 0.0678664 |
| 7 | 400 | 0.974725 | 0.974725 | 0.928963 | 0.625275 | 0.0912569 |
| 8 | 450 | 0.974725 | 0.974725 | 0.947396 | 0.625275 | 0.0668796 |
| 9 | 500 | 0.974725 | 0.974725 | 0.944465 | 0.625275 | 0.0675292 |
| 10 | 550 | 0.974725 | 0.974725 | 0.944429 | 0.625275 | 0.0662672 |
| 11 | 600 | 0.974725 | 0.974725 | 0.936443 | 0.625275 | 0.0796977 |
| 12 | 650 | 0.974725 | 0.974725 | 0.95193 | 0.625275 | 0.0482395 |

|  |  |
| --- | --- |
| 最优参数/结果 | 数值 |
| 目标函数值 | 0.974725275 |
| C | 256 |
| gamma | 0.00390625 |

|  |  |
| --- | --- |
| 结果参数 | 值 |
| 验证集查准率 | 100.00% |
| 验证集查全率 | 96.83% |
| 验证集F1值 | 98.39% |

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| --- | --- | --- | --- | --- |
|  | precision | recall | f1-score | support |
| 0 | 0.98 | 1 | 0.99 | 108 |
| 1 | 1 | 0.97 | 0.98 | 63 |
| accuracy |  |  | 0.99 | 171 |
| macro avg | 0.99 | 0.98 | 0.99 | 171 |
| weighted avg | 0.99 | 0.99 | 0.99 | 171 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | precision | recall | f1-score | support |
| 0 | 0.94 | 0.95 | 0.95 | 108 |
| 1 | 0.92 | 0.9 | 0.91 | 63 |
| accuracy |  |  | 0.94 | 171 |
| macro avg | 0.93 | 0.93 | 0.93 | 171 |
| weighted avg | 0.94 | 0.94 | 0.94 | 171 |

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| --- | --- | --- |
| type | train | test |
| 0 | 0.625628 | 0.631579 |
| 1 | 0.374372 | 0.368421 |

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| --- | --- | --- | --- | --- | --- | --- |
| gen | eval | f\_opt | f\_max | f\_avg | f\_min | f\_std |
| 0 | 50 | 0.650595 | 0.650595 | 0.650595 | 0.650595 | 0.000000 |
| 1 | 100 | 1.000000 | 1.000000 | 0.657583 | 0.650595 | 0.048917 |
| 2 | 150 | 1.000000 | 1.000000 | 0.671464 | 0.650595 | 0.082604 |
| 3 | 200 | 1.000000 | 1.000000 | 0.685440 | 0.650595 | 0.104537 |
| 4 | 250 | 1.000000 | 1.000000 | 0.726917 | 0.650595 | 0.143756 |
| 5 | 300 | 1.000000 | 1.000000 | 0.767750 | 0.650595 | 0.163341 |
| 6 | 350 | 1.000000 | 1.000000 | 0.877917 | 0.650595 | 0.163446 |
| 7 | 400 | 1.000000 | 1.000000 | 0.975750 | 0.650595 | 0.082749 |
| 8 | 450 | 1.000000 | 1.000000 | 0.960679 | 0.650595 | 0.103903 |
| 9 | 500 | 1.000000 | 1.000000 | 0.983024 | 0.650595 | 0.068508 |
| 10 | 550 | 1.000000 | 1.000000 | 0.929393 | 0.650595 | 0.138186 |
| 11 | 600 | 1.000000 | 1.000000 | 0.946333 | 0.650595 | 0.118346 |

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| --- | --- | --- | --- | --- | --- | --- |
| gen | eval | f\_opt | f\_max | f\_avg | f\_min | f\_std |
| 0 | 50 | 0.458929 | 0.458929 | 0.458929 | 0.458929 | 0.000000 |
| 1 | 100 | 0.458929 | 0.458929 | 0.458929 | 0.458929 | 0.000000 |
| 2 | 150 | 0.458929 | 0.458929 | 0.458929 | 0.458929 | 0.000000 |
| 3 | 200 | 0.995238 | 0.995238 | 0.469655 | 0.458929 | 0.075083 |
| 4 | 250 | 0.995238 | 0.995238 | 0.512560 | 0.458929 | 0.160893 |
| 5 | 300 | 0.995238 | 0.995238 | 0.587548 | 0.458929 | 0.228880 |
| 6 | 350 | 0.995238 | 0.995238 | 0.727083 | 0.458929 | 0.268155 |
| 7 | 400 | 0.995238 | 0.995238 | 0.970250 | 0.458929 | 0.100727 |
| 8 | 450 | 0.995238 | 0.995238 | 0.937976 | 0.458929 | 0.157534 |
| 9 | 500 | 0.995238 | 0.995238 | 0.929583 | 0.458929 | 0.173974 |
| 10 | 550 | 0.995238 | 0.995238 | 0.960476 | 0.458929 | 0.127142 |
| 11 | 600 | 0.995238 | 0.995238 | 0.990071 | 0.939881 | 0.014312 |

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| --- | --- | --- | --- | --- | --- | --- |
| gen | eval | f\_opt | f\_max | f\_avg | f\_min | f\_std |
| 0 | 50 | 0.974215 | 0.974215 | 0.765808 | 0.661775 | 0.084724 |
| 1 | 100 | 0.974215 | 0.974215 | 0.782943 | 0.208635 | 0.121709 |
| 2 | 150 | 0.974215 | 0.974215 | 0.764341 | 0.208635 | 0.142324 |
| 3 | 200 | 0.974275 | 0.974275 | 0.813611 | 0.660326 | 0.089269 |
| 4 | 250 | 0.974275 | 0.974275 | 0.883663 | 0.732548 | 0.074192 |
| 5 | 300 | 0.977174 | 0.977174 | 0.896091 | 0.208635 | 0.115274 |
| 6 | 350 | 0.977174 | 0.975725 | 0.905279 | 0.586836 | 0.072746 |
| 7 | 400 | 0.977174 | 0.975725 | 0.915667 | 0.705012 | 0.055133 |
| 8 | 450 | 0.977174 | 0.977114 | 0.930570 | 0.821981 | 0.037391 |
| 9 | 500 | 0.978563 | 0.978563 | 0.932746 | 0.709360 | 0.041439 |
| 10 | 550 | 0.978563 | 0.978563 | 0.925806 | 0.735386 | 0.048587 |
| 11 | 600 | 0.978563 | 0.974275 | 0.934233 | 0.821981 | 0.028511 |
| 12 | 650 | 0.978563 | 0.974275 | 0.931943 | 0.682065 | 0.043917 |
| 13 | 700 | 0.978563 | 0.974275 | 0.933545 | 0.818659 | 0.039668 |
| 14 | 750 | 0.978563 | 0.974275 | 0.937030 | 0.739734 | 0.044462 |
| 15 | 800 | 0.978563 | 0.975725 | 0.902665 | 0.208635 | 0.119352 |
| 16 | 850 | 0.978563 | 0.975725 | 0.887860 | 0.208635 | 0.151423 |
| 17 | 900 | 0.978563 | 0.977174 | 0.887418 | 0.208635 | 0.152284 |
| 18 | 950 | 0.978563 | 0.977174 | 0.906812 | 0.739734 | 0.065377 |
| 19 | 1000 | 0.978563 | 0.974215 | 0.899761 | 0.208635 | 0.120832 |
| 20 | 1050 | 0.978563 | 0.971377 | 0.902320 | 0.208635 | 0.118109 |
| 21 | 1100 | 0.978563 | 0.971377 | 0.862443 | 0.208635 | 0.176612 |
| 22 | 1150 | 0.978563 | 0.972766 | 0.906797 | 0.702597 | 0.069797 |
| 23 | 1200 | 0.980012 | 0.980012 | 0.922505 | 0.729650 | 0.052874 |
| 24 | 1250 | 0.980012 | 0.980012 | 0.924052 | 0.806099 | 0.049105 |
| 25 | 1300 | 0.980012 | 0.979952 | 0.920430 | 0.818659 | 0.047841 |
| 26 | 1350 | 0.980012 | 0.979952 | 0.903758 | 0.208635 | 0.150861 |
| 27 | 1400 | 0.980012 | 0.978563 | 0.909437 | 0.208635 | 0.148833 |
| 28 | 1450 | 0.980012 | 0.980012 | 0.909771 | 0.443599 | 0.092281 |
| 29 | 1500 | 0.980012 | 0.980012 | 0.917089 | 0.729650 | 0.070470 |

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| --- | --- | --- | --- | --- | --- | --- |
| gen | eval | f\_opt | f\_max | f\_avg | f\_min | f\_std |
| 0 | 50 | 0.106581 | 0.106581 | 0.095740 | 0.095470 | 0.001560 |
| 1 | 100 | 0.983314 | 0.983314 | 0.114005 | 0.095470 | 0.124221 |
| 2 | 150 | 0.983314 | 0.983314 | 0.148963 | 0.095470 | 0.210801 |
| 3 | 200 | 0.983314 | 0.983314 | 0.237445 | 0.095470 | 0.325263 |
| 4 | 250 | 0.983314 | 0.983314 | 0.351703 | 0.095470 | 0.396468 |
| 5 | 300 | 0.983314 | 0.983314 | 0.387943 | 0.095470 | 0.409675 |
| 6 | 350 | 0.983314 | 0.983314 | 0.524902 | 0.095470 | 0.436816 |
| 7 | 400 | 0.983314 | 0.983314 | 0.892352 | 0.095470 | 0.252824 |
| 8 | 450 | 0.983314 | 0.983314 | 0.900566 | 0.096264 | 0.241272 |
| 9 | 500 | 0.983314 | 0.983314 | 0.951082 | 0.095470 | 0.131613 |
| 10 | 550 | 0.983314 | 0.983314 | 0.860785 | 0.095470 | 0.285155 |
| 11 | 600 | 0.983314 | 0.983314 | 0.834142 | 0.095470 | 0.321899 |

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| --- | --- | --- | --- | --- |
|  | precision | recall | f1-score | support |
| 0 | 1 | 0.92 | 0.96 | 24 |
| 1 | 0.97 | 1 | 0.99 | 69 |
| accuracy |  |  | 0.98 | 93 |
| macro avg | 0.99 | 0.96 | 0.97 | 93 |
| weighted avg | 0.98 | 0.98 | 0.98 | 93 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | precision | recall | f1-score | support |
| DH | 0.67 | 0.56 | 0.61 | 18 |
| NO | 0.7 | 0.79 | 0.75 | 24 |
| SL | 0.98 | 0.98 | 0.98 | 51 |
| accuracy |  |  | 0.85 | 93 |
| macro avg | 0.78 | 0.78 | 0.78 | 93 |
| weighted avg | 0.85 | 0.85 | 0.85 | 93 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | precision | recall | f1-score | support |
| 1 | 0.98 | 0.96 | 0.97 | 765 |
| 2 | 0.97 | 1 | 0.98 | 904 |
| 3 | 1 | 0.94 | 0.97 | 463 |
| 4 | 0.88 | 0.99 | 0.93 | 568 |
| 5 | 0.99 | 0.98 | 0.98 | 888 |
| 6 | 0.99 | 0.91 | 0.95 | 585 |
| accuracy |  |  | 0.97 | 4173 |
| macro avg | 0.97 | 0.96 | 0.96 | 4173 |
| weighted avg | 0.97 | 0.97 | 0.97 | 4173 |

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| --- | --- | --- | --- | --- |
|  | precision | recall | f1-score | support |
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