|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Some benchmark of MOT2015 (test)** | | | | | |
| RANK | Algorithm | MOTA | IDsw | Average FPS | Detector |
| 1 | [KCF](https://motchallenge.net/tracker/KCF) | 38.9 ± 14.5 | 720 (13.9) | 0.3 | Public |
| … | … | … | … | … | Public |
| 15 | [DCCRF](https://motchallenge.net/tracker/DCCRF) | 33.6 ± 11.0 | 866 (19.4) | 0.1 | Public |
| … | … | … | … | … | Public |
| 26 | MDP | 30.3 ± 14.6 | 680 | 1.1 | Public |
| … | … | … | … | … | Public |
| 41 | DAC\_min | 26.1 ± 13.5 | 506 | 11.6 | Public |
| … | … | … | … | … | Public |
| 60 | LP2D | 19.8 ± 14.2 | 1649 | 112.1 | Public |
| … | … | … | … | … | Public |
| 65 | RNN\_LSTM | 19.0 ± 15.2 | 1490 | 165.2 | Public |
| **66** | **Ours** | **18.7 ± 16.3** | **1290** | **21.3** | **Private** |
| 67 | RMOT | 18.6 ± 17.5 | 684 | 7.9 | Public |
| … | … | … | … | … | Public |
| 71 | GSCRR | 15.8 ± 10.5 | 514 | 28.1 | Public |
| … | … | … | … | … | Public |
| 75 | DP\_NMS | 14.5 ± 14.5 | 4,537 | 444.8 | Public |
| 76 | LDCT | 4.7 ± 41.3 | 12,348 | 20.7 | Public |

MOT challenge Website: <https://motchallenge.net/results/2D_MOT_2015/?chl=2&orderBy=MOTA&orderStyle=ASC&det=Public>

NOTE: the other models above use provided detection result and only ran tracker for the evaluation. Our model run both detection (YOLOv3 tiny) and tracker (modified Deep SORT).

# **ALL SUMMARY**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **FULL TABLE (ALL) [Only choose the skip1 for comparison]** | | | | |
| Algorithm | MOTA | IDsw | Average FPS | Some metrics? |
| Vanilla YOLOv3 Tiny + Deep SORT | 33.6% | 635 | 9.997820328723746 |  |
| YOLOv3 Tiny + Deep SORT (skip1) | 30.7% | 570 | 21.04679665688465 |  |
| YOLOv3 Tiny + Deep SORT (skip1 with probability-driven) | 31.0% | 594 | 20.462735731270826 |  |
|  |  |  |  |  |
| Vanilla Mobilenet SSD + Deep SORT | 19.0% | 577 | 9.8474409913098 |  |
| Mobilenet SSD + Deep SORT (skip1) | 17.7% | 520 | 15.964183221155363 |  |
| Mobilenet SSD + Deep SORT (skip1 with probability-driven) | 18.0% | 523 | 14.404656840037314 |  |
|  |  |  |  |  |
| Vanilla Squeezenet\_1\_0 + Deep SORT | 9.9% | 484 | 20.042197668270926 |  |
| Squeezenet 1.0 + Deep SORT (skip1) | 9.3% | 470 | 33.892409156740605 |  |
| Squeezenet 1.0 + Deep SORT (skip1 with probability-driven) | 9.4% | 475 | 32.83395018961477 |  |
|  |  |  |  |  |

# **YOLOv3 Tiny + Deep SORT**

|  |  |  |  |
| --- | --- | --- | --- |
| **FULL TABLE (YOLOv3\_tiny + Deep SORT)** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla YOLOv3 Tiny + Deep SORT | 33.6% | 635 | 9.997820328723746 |
| YOLOv3 Tiny + Deep SORT with Down Sampling | 32.9% | 651 | 11.996064715800753 |
| … |  |  |  |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame | 30.7% | 570 | 16.56956741670473  (latest:21.04679665688465) |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame and Down Sampling | 30.0% | 577 | 20.99549490626117 |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame and Probability Driven | 31.0% | 594 | 17.757431631657468  (latest:20.46273573127082) |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame and Probability Driven and Down Sampling | 30.4% | 601 | 19.84908451201911 |
| … |  |  |  |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame | 26.3% | 581 | 20.68914912740483 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame and Down Sampling | 25.6% | 538 | 25.16089209909558 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame and Probability Driven | 28.2% | 581 | 21.671446463250184 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame and Probability Driven and Down Sampling | 27.2% | 561 | 22.40254902085448 |
| … |  |  |  |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame | 17.4% | 858 | 30.685362182060103 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame and Down Sampling | 17.3% | 826 | 32.71531749075337 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame and Probability Driven | 22.0% | 778 | 26.27376224976722 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame and Probability Driven and Down Sampling | 21.5% | 721 | 28.642976056106697 |
| … |  |  |  |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame | 11.5% | 809 | 35.487960011851555 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame and Down Sampling | 11.1% | 821 | 36.79384991372523 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame and Probability Driven | 17.7% | 758 | 28.440129230784574 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame and Probability Driven and Down Sampling | 17.2% | 760 | 30.637051555246025 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Down Sampling** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla YOLOv3 Tiny + Deep SORT | 33.6% | 635 | 9.997820328723746 |
| YOLOv3 Tiny + Deep SORT with Down Sampling | 32.9% | 651 | 11.996064715800753 |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame | 30.7% | 570 | 16.56956741670473 |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame and Down Sampling | 30.0% | 577 | 20.99549490626117 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame | 26.3% | 581 | 20.68914912740483 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame and Down Sampling | 25.6% | 538 | 25.16089209909558 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame | 17.4% | 858 | 30.685362182060103 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame and Down Sampling | 17.3% | 826 | 32.71531749075337 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame | 11.5% | 809 | 35.487960011851555 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame and Down Sampling | 11.1% | 821 | 36.79384991372523 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Skipping Frame** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla YOLOv3 Tiny + Deep SORT | 33.6% | 635 | 9.997820328723746 |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame | 30.7% | 570 | 16.56956741670473 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame | 26.3% | 581 | 20.68914912740483 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame | 17.4% | 858 | 30.685362182060103 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame | 11.5% | 809 | 35.487960011851555 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Using probability Driven Detection** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla YOLOv3 Tiny + Deep SORT | 33.6% | 635 | 9.997820328723746 |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame | 30.7% | 570 | 18.56956741670473 |
| YOLOv3 Tiny + Deep SORT with 1 Skip Frame and Probability Driven | 31.0% | 594 | 17.757431631657468 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame | 26.3% | 581 | 22.68914912740483 |
| YOLOv3 Tiny + Deep SORT with 2 Skip Frame and Probability Driven | 28.2% | 581 | 21.671446463250184 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame | 17.4% | 858 | 30.685362182060103 |
| YOLOv3 Tiny + Deep SORT with 4 Skip Frame and Probability Driven | 22.0% | 778 | 26.27376224976722 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame | 11.5% | 809 | 35.487960011851555 |
| YOLOv3 Tiny + Deep SORT with 6 Skip Frame and Probability Driven | 17.7% | 758 | 28.440129230784574 |
|  |  |  |  |

# **Mobilenet SSD + Deep SORT**

|  |  |  |  |
| --- | --- | --- | --- |
| **FULL TABLE (Mobilenet SSD + Deep SORT)** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Mobilenet SSD + Deep SORT | 19.0% | 577 | 9.8474409913098 |
| Mobilenet SSD+ Deep SORT with Down Sampling | 17.5% | 647 | 10.164599991702229 |
| … |  |  |  |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame | 17.7% | 520 | 15.964183221155363 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame and Down Sampling | 16.6% | 569 | 16.252922740164827 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame and Probability Driven | 18.0% | 523 | 14.404656840037314 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame and Probability Driven and Down Sampling | 16.8% | 573 | 14.878176973130104 |
| … |  |  |  |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame | 15.7% | 494 | 20.658319625464184 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame and Down Sampling | 14.4% | 530 | 20.67430430123686 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame and Probability Driven | 16.5% | 503 | 17.894475042242103 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame and Probability Driven and Down Sampling | 15.5% | 553 | 18.656240404675874 |
| … |  |  |  |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame | 10.7% | 569 | 27.779953587538593 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame and Down Sampling | 9.5% | 577 | 28.811689015745316 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame and Probability Driven | 13.2% | 552 | 22.686678543601083 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame and Probability Driven and Down Sampling | 12.0% | 567 | 24.149181226030407 |
| … |  |  |  |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame | 7.7% | 586 | 32.62759230159879 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame and Down Sampling | 6.0% | 632 | 33.97791236616167 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame and Probability Driven | 10.7% | 558 | 26.286393126809276 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame and Probability Driven and Down Sampling | 9.9% | 601 | 27.845049291724436 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Down Sampling** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Mobilenet SSD + Deep SORT | 19.0% | 577 | 9.8474409913098 |
| Mobilenet SSD+ Deep SORT with Down Sampling | 17.5% | 647 | 10.164599991702229 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame | 17.7% | 520 | 15.964183221155363 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame and Down Sampling | 16.6% | 569 | 16.252922740164827 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame | 15.7% | 494 | 20.658319625464184 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame and Down Sampling | 14.4% | 530 | 20.67430430123686 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame | 10.7% | 569 | 27.779953587538593 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame and Down Sampling | 9.5% | 577 | 28.811689015745316 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame | 7.7% | 586 | 32.62759230159879 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame and Down Sampling | 6.0% | 632 | 33.97791236616167 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Skipping Frame** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Mobilenet SSD + Deep SORT | 19.0% | 577 | 9.8474409913098 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame | 17.7% | 520 | 15.964183221155363 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame | 15.7% | 494 | 20.658319625464184 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame | 10.7% | 569 | 27.779953587538593 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame | 7.7% | 586 | 32.62759230159879 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Using probability Driven Detection** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Mobilenet SSD + Deep SORT | 19.0% | 577 | 9.8474409913098 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame | 17.7% | 520 | 15.964183221155363 |
| Mobilenet SSD+ Deep SORT with 1 Skip Frame and Probability Driven | 18.0% | 523 | 14.404656840037314 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame | 15.7% | 494 | 20.658319625464184 |
| Mobilenet SSD+ Deep SORT with 2 Skip Frame and Probability Driven | 16.5% | 503 | 17.894475042242103 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame | 10.7% | 569 | 27.779953587538593 |
| Mobilenet SSD+ Deep SORT with 4 Skip Frame and Probability Driven | 13.2% | 552 | 22.686678543601083 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame | 7.7% | 586 | 32.62759230159879 |
| Mobilenet SSD+ Deep SORT with 6 Skip Frame and Probability Driven | 10.7% | 558 | 26.286393126809276 |
|  |  |  |  |

# **Squeezenetv1.0 + Deep SORT**

|  |  |  |  |
| --- | --- | --- | --- |
| **FULL TABLE(Squeezenet\_1\_0 + Deep SORT)** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Squeezenet\_1\_0 + Deep SORT | 9.9% | 484 | 20.042197668270926 |
| Squeezenet\_1\_0+ Deep SORT with Down Sampling | 9.4% | 433 | 20.717160451288965 |
| … |  |  |  |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame | 9.3% | 470 | 33.892409156740605 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame and Down Sampling | 8.9% | 438 | 34.70319714140534 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame and Probability Driven | 9.4% | 475 | 32.83395018961477 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame and Probability Driven and Down Sampling | 9.0% | 442 | 34.2523215195093 |
| … |  |  |  |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame | 8.4% | 408 | 42.13578772760607 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame and Down Sampling | 8.2% | 372 | 43.91007535351279 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame and Probability Driven | 8.6% | 412 | 40.69885878710128 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame and Probability Driven and Down Sampling | 8.3% | 368 | 43.13519724065963 |
| … |  |  |  |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame | 6.8% | 328 | 53.7290647954817 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame and Down Sampling | 6.6% | 301 | 56.63252656732362 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame and Probability Driven | 7.3% | 343 | 49.940943534497414 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame and Probability Driven and Down Sampling | 6.9% | 312 | 53.98874989205801 |
| … |  |  |  |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame | 5.6% | 301 | 62.0070361055159 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame and Down Sampling | 5.4% | 284 | 63.02879991725403 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame and Probability Driven | 6.1% | 313 | 58.15515176744455 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame and Probability Driven and Down Sampling | 6.0% | 297 | 59.56392827961034 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Down Sampling** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Squeezenet\_1\_0 + Deep SORT | 9.9% | 484 | 20.042197668270926 |
| Squeezenet\_1\_0+ Deep SORT with Down Sampling | 9.4% | 433 | 20.717160451288965 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame | 9.3% | 470 | 33.892409156740605 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame and Down Sampling | 8.9% | 438 | 34.70319714140534 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame | 8.4% | 408 | 42.13578772760607 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame and Down Sampling | 8.2% | 372 | 43.91007535351279 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame | 6.8% | 328 | 53.7290647954817 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame and Down Sampling | 6.6% | 301 | 56.63252656732362 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame | 5.6% | 301 | 62.0070361055159 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame and Down Sampling | 5.4% | 284 | 63.02879991725403 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Skipping Frame** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Squeezenet\_1\_0 + Deep SORT | 9.9% | 484 | 20.042197668270926 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame | 9.3% | 470 | 33.892409156740605 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame | 8.4% | 408 | 42.13578772760607 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame | 6.8% | 328 | 53.7290647954817 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame | 5.6% | 301 | 62.0070361055159 |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tradeoff of Using probability Driven Detection** | | | |
| Algorithm | MOTA | IDsw | Average FPS |
| Vanilla Squeezenet\_1\_0 + Deep SORT | 9.9% | 484 | 20.042197668270926 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame | 9.3% | 470 | 33.892409156740605 |
| Squeezenet\_1\_0+ Deep SORT with 1 Skip Frame and Probability Driven | 9.4% | 475 | 32.83395018961477 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame | 8.4% | 408 | 42.13578772760607 |
| Squeezenet\_1\_0+ Deep SORT with 2 Skip Frame and Probability Driven | 8.6% | 412 | 40.69885878710128 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame | 6.8% | 328 | 53.7290647954817 |
| Squeezenet\_1\_0+ Deep SORT with 4 Skip Frame and Probability Driven | 7.3% | 343 | 49.940943534497414 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame | 5.6% | 301 | 62.0070361055159 |
| Squeezenet\_1\_0+ Deep SORT with 6 Skip Frame and Probability Driven | 6.1% | 313 | 58.15515176744455 |
|  |  |  |  |