# Architecture and Details

 

**Table 1.** Quantitative comparison of mainstream segmentation methods on the BraTS2020 dataset

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methods | Dice↑  BER↓  MAE↓  ↑ | | | | IoU↑  FLOPS/G↓  Times | | | | Sensitivity↑ | | | | HD95↓ | | | |  | FLOPs(G) |
|  | WT | TC | ET | Mean | WT | TC | ET | Mean | WT | TC | ET | Mean | WT | TC | ET | Mean |  |  |
| U-Net++2019[14] | 0.8964 | 0.8204 | 0.8392 | 0.8520 | 0.8075 | 0.6986 | 0.7147 | 0.7403 | 0.8717 | 0.7458 | 0.7785 | 0.7987 | 2.7990 | 1.6236 | 2.0128 | 2.1451 |  | 106.20 |
| CENet2019[16] | 0.9067 | 0.8487 | 0.8366 | 0.8640 | 0.8293 | 0.7371 | 0.7191 | 0.7618 | 0.8965 | 0.8143 | 0.8248 | 0.8452 | 2.7799 | 1.9564 | 1.6483 | 2.1275 |  | 6.85 |
| U-Net3+2020[15] | 0.9034 | 0.8320 | 0.8555 | 0.8636 | 0.8238 | 0.7124 | 0.7474 | 0.7612 | 0.8818 | 0.7869 | 0.8340 | 0.8342 | 2.7700 | 1.9852 | 1.6263 | 2.1281 |  | 153.25 |
| CaraNet2022[17] | 0.8869 | 0.8274 | 0.7733 | 0.8292 | 0.7968 | 0.7056 | 0.6304 | 0.7109 | 0.8772 | 0.8207 | 0.8259 | 0.8446 | 2.9899 | 1.9704 | 1.7627 | 2.2410 |  | 8.81 |
| HiFormer2023[18] | 0.8975 | 0.8219 | 0.8207 | 0.8467 | 0.8141 | 0.6976 | 0.6959 | 0.7359 | 0.8829 | 0.7912 | 0.7913 | 0.8218 | 2.8324 | 2.1966 | 1.7330 | 2.2540 |  | 18.86 |
| AsymFormer2024[11] | 0.8674 | 0.8512 | 0.8195 | 0.8460 | 0.8167 | 0.7658 | 0.6942 | 0.7337 | 0.8556 | 0.8244 | 0.8316 | 0.8372 | 3.0734 | 1.9005 | 1.6369 | 2.2036 |  | 5.86 |
| ACANet2024[27] | 0.9117 | 0.8647 | 0.8509 | 0.8758 | 0.8376 | 0.7617 | 0.7405 | 0.7800 | 0.9134 | 0.8556 | 0.8721 | 0.8804 | 2.7452 | 2.0193 | 1.7336 | 2.1660 |  | 23.46 |
| AFENet2025[12] | 0.8993 | 0.8422 | 0.8183 | 0.8533 | 0.8171 | 0.7275 | 0.6925 | 0.7457 | 0.8862 | 0.8208 | 0.8070 | 0.8380 | 2.8462 | 1.9533 | 1.6281 | 2.1425 |  | 4.94 |
| DGCANet2025[19] | 0.9019 | 0.8282 | 0.8253 | 0.8608 | 0.8213 | 0.7068 | 0.7426 | 0.7569 | 0.8929 | 0.7951 | 0.8452 | 0.8444 | 2.7895 | 2.1418 | 1.7242 | 2.2185 |  | 19.07 |
| FusionLunNet2025[20] | 0.9020 | 0.8362 | 0.8280 | 0.8554 | 0.8215 | 0.7185 | 0.7065 | 0.7488 | 0.8785 | 0.7978 | 0.8255 | 0.8329 | 2.7976 | 2.0208 | 1.6837 | 2.1674 |  | 30.48 |
| WFNet-ML | 0.9119 | 0.8659 | 0.8536 | 0.8771 | 0.8380 | 0.7635 | 0.7447 | 0.7821 | 0.9110 | 0.8511 | 0.8595 | 0.8739 | 2.7680 | 1.8911 | 1.5758 | 2.0783 |  | 17.01 |
| ANANet-ML | 0.9121 | 0.8657 | 0.8559 | 0.8779 | 0.8385 | 0.7632 | 0.7481 | 0.7833 | 0.9109 | 0.8771 | 0.8665 | 0.8848 | 2.7373 | 2.0350 | 1.6895 | 2.1540 |  | 17.06 |

**Table 2.** Quantitative comparison of mainstream segmentation methods on the BraTS 2021 dataset

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methods | Dice↑  BER↓  MAE↓  ↑ | | | | IoU↑  FLOPS/G↓  Times | | | | Sensitivity↑ | | | | HD95↓ | | | |
|  | WT | TC | ET | Mean | WT | TC | ET | Mean | WT | TC | ET | Mean | WT | TC | ET | Mean |
| U-Net++2019[42] | 0.9088 | 0.8956 | 0.8801 | 0.8948 | 0.8328 | 0.8109 | 0.7859 | 0.8099 | 0.8649 | 0.8856 | 0.9152 | 0.8886 | 2.6661 | 1.9180 | 1.8533 | 2.1458 |
| CENet2019[41] | 0.9173 | 0.9095 | 0.8693 | 0.8987 | 0.8473 | 0.8339 | 0.7688 | 0.8167 | 0.9047 | 0.8779 | 0.8744 | 0.8857 | 2.6800 | 1.5584 | 1.5907 | 1.9430 |
| U-Net3+2020[43] | 0.9118 | 0.9060 | 0.8849 | 0.9009 | 0.8379 | 0.8281 | 0.7935 | 0.8199 | 0.8715 | 0.8704 | 0.8677 | 0.8699 | 2.6594 | 1.7091 | 1.6827 | 2.0171 |
| CaraNet2022[44] | 0.9062 | 0.9021 | 0.8034 | 0.8705 | 0.8285 | 0.8216 | 0.6714 | 0.7738 | 0.9104 | 0.8887 | 0.9176 | 0.9056 | 2.8261 | 1.6093 | 1.8161 | 2.0838 |
| HiFormer2023[45] | 0.9247 | 0.9130 | 0.8724 | 0.9034 | 0.8600 | 0.8399 | 0.7737 | 0.8246 | 0.9030 | 0.8976 | 0.8851 | 0.8952 | 2.6146 | 1.7954 | 1.8326 | 2.0809 |
| AsymFormer2024[46] | 0.8949 | 0.9156 | 0.8499 | 0.8868 | 0.8098 | 0.8444 | 0.7389 | 0.7977 | 0.8784 | 0.8967 | 0.8751 | 0.8834 | 2.5964 | 1.8452 | 1.7599 | 2.0672 |
| ACANet2024[47] | 0.9318 | 0.9225 | 0.8862 | 0.9135 | 0.8723 | 0.8561 | 0.7957 | 0.8413 | 0.9129 | 0.9031 | 0.8859 | 0.9006 | 2.5102 | 1.6469 | 1.6866 | 1.9479 |
| AFENet2025[48] | 0.9227 | 0.9108 | 0.8708 | 0.9014 | 0.8462 | 0.8289 | 0.7906 | 0.8219 | 0.8810 | 0.8942 | 0.8866 | 0.8872 | 2.6027 | 1.7006 | 1.7434 | 2.0156 |
| DGCANet2025[49] | 0.9235 | 0.9159 | 0.8808 | 0.9067 | 0.8579 | 0.8448 | 0.7869 | 0.8299 | 0.9086 | 0.8921 | 0.8916 | 0.8974 | 2.5964 | 1.8452 | 1.7899 | 2.0771 |
| FusionLunNet2025[50] | 0.9220 | 0.9109 | 0.8722 | 0.9017 | 0.8553 | 0.8363 | 0.7734 | 0.8217 | 0.9092 | 0.9060 | 0.8845 | 0.8996 | 2.6299 | 1.8968 | 1.9082 | 2.1450 |
| WFNet-ML | 0.9341 | 0.9246 | 0.8858 | 0.9148 | 0.8764 | 0.8597 | 0.7949 | 0.8437 | 0.9247 | 0.9043 | 0.9066 | 0.9066 | 2.5099 | 1.4986 | 1.5580 | 1.8555 |
| ANANet-ML | 0.9346 | 0.9234 | 0.8866 | 0.9149 | 0.8773 | 0.8577 | 0.7964 | 0.8438 | 0.9239 | 0.9130 | 0.9071 | 0.9103 | 2.4913 | 1.7017 | 1.7377 | 1.9769 |