# A comparism and evaluation of local method stereo matching algorithm

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Abstract—We implement & modify many local stereo matching method, test and compare their results. For real time FPGA & ASIC stereo matching, there are many hardware limitations. In software stereo matching, many state-of-the-arts depend on global method using highly memory access and computation cost, which usually comes from energy minimization & iterations. But for the purpose of hardware real time solution, condition is quite different. In FPGA core, only limited memories is allowed to access, otherwise outside sdram access is required. While implementation global method on FPGA, large amount of iteratively sdram access makes real-time impossible. To deal with that, we survey & modify many local stereo matching method with potential or already implemented on FPGA previously, and put them into test & evaluation on software environment, and further more test them in future on FPGA Arria EP2AGX125.

Keywords- stereo matching; local method; evaluation







Window censue, 31\*31 aggregation size, 31\*31 Err, 6.62%



AD+ census, 31\*31 aggregation size, 31\*31 Err, 8.63%



aggregation size, 31\*31 Err, 13.2%

Window censue, 31\*31 aggregation size, 31\*31 scan line optimization Err, 6.55%

## SAD + aggregation + WTA

#### mini census + aggregation + WTA

### window census +





SAD, 8x8 aggregation size, 8\*8 Err, 13.9%



SAD, 8x8, aggregation size, 15\*15 Err, 12.6%



SAD, 8x8, aggregation size, 31\*31 Err, 13.33%

Mini census

WTA Err, 71%



Mini census aggregation size, 5\*5 WTA Err, 52%



Mini census aggregation, size, 15\*15 WTA Err, 31%



Mini census aggregation size, 31\*31 WTA Err, 31%





#### window census + aggregation + WTA

Disparity weighted voting





Window census, 8x8

aggregation size, 8x8

WTA

Err, 21%













Window census, 15\*15 WTA Err, 26%



Window census, 31x31 WTA Err, 20 %



Window census, 15x15 aggregation size, 15\*15 WTA Err, 9.8%



Window census, 20x20 aggregation size, 20x20 WTA Err, 7.45%



Window census, 31x31 aggregation size, 31x31 WTA Err, 5.28%



Window census, 31x31 aggregation size, 31x31 WTA Err, 5.28%



Horizontal disparity weighted voting, Voting size, 10\*10 Err, 4.98%



**Horizontal & Vertical** disparity weighted voting Voting size, 20\*20 Err, 4.97%



**Vertical & Horizontal** disparity weighted voting Voting size, 20\*20 Err, 4.92%



Vertical, Horizontal & Vertical disparity weighted voting Voting size, 20\*20 Err, 4.97

#### Middle buffer

#### census transform







Window census, 12\*12 aggregation size, 12\*12

[1]

[2]

[3]

[4]

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