Analysis of extrinsics problem of SVS 3DoF+ extension

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# VSRS definition

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| [w9595](http://wg11.sc29.org/doc_end_user/current_document.php?id=26692&id_meeting=) | 83 - Antalya | 2008-01-17 | 2008-01-19 | All Video | Call for Contributions on 3D Video Test Material (Update) | Video |
| [w15349](http://wg11.sc29.org/doc_end_user/current_document.php?id=52901&id_meeting=) | 112 - Warsaw | 2015-06-26 | 2015-07-11 01:30:00 | All Requirements | FTV Software Framework | Requirements |

From N9595 Annex A (repeated in N15349), we conclude that:

The extrinsics matrix in the VSRS camera parameters file corresponds to:

When reprojecting from camera 1 to camera 2:

Hence with:

# SVS projstudy

In a Philips-internal branch “projstudy” (not pushed to MPEG git,) we have reduced the projection code of SVS master to

// Unproject

cv::Vec3f const v(

(d / fx) \* (x + offset - px),

(d / fx) \* (y + offset - py),

d);

// Translate

cv::Vec3f vt = v - t;

// Rotate

cv::Vec3f vtR = cv::Matx33f(R).t() \* vt;

// Project

cv::Vec3f vtRQ = (n\_fx / sensor) \* vtR / vtR[2];

// Scale

new\_pos.at<cv::Vec2f>(y, x) = rescale \* cv::Vec2f(

vtRQ[0] \* w + n\_px,

vtRQ[1] \* w + n\_py);

The *Project* and *Scale* step have been refined after, but more importantly:

Then, in SynthetizedView.cpp:

Translation real\_transl\_camera\_coord(img.get\_parameters().rotation \* (cv::Mat) (-img.get\_parameters().translation + parameter.translation));

cv::Mat rotation\_camera\_coord = parameter.rotation.t() \* img.get\_parameters().rotation;

because img relates to the input view (1) and **this** to the output view (2), this corresponds to:

Filling in yields:

This must be a bug because of . It should be:

Because then:

Which is exactly what was derived for VSRS.

* With this change, synthesis on TechnicolorMuseum appears to work.
* However PSNRs on ULB Unicorn are lower. For “ULB\_Unicorn\_Triangles\_Simple”:
  + With fix: 20.3999 (entire frame), 24.5674 (central ROI)
  + Before fix: 21.1479 (entire frame), 26.0399 (central ROI)

# SVS master

Double-check on projstudy:

* No difference in ViewSynthetizer.cpp
* Transform.cpp:
  + Line 103: cv::Mat Rt = R.t()
  + Line 118: cv::Mat Vr = Rt\*(cv::Mat)vt;
* Rotations are consistent with
* Translation is not easy to check

# Image check

* Output of SVS master and projstudy is virtually the same
* Output of SVS feature/3DoFp with corrected equations is different