A Novel Method for Determination of Camera Pose Estimation Based on Angle Constraints

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The method proposed here solves for the pose of an object and is most applicable in robotics. The calculation of camera pose estimation has been solved in many ways. The general solution involves finding the relationship between the object's 3D coordinates and the coordinates from a 2D image. This solution yields the pitch, roll, and yaw of the object with respect to the camera, as well the displacement in x, y, and z. With most robotics, roll and yaw are constant because a robot won't tilt sideways or forwards, therefore pitch is the only unknown within the rotation matrix. The pitch may be calculated through a proportion from the camera's field of view, therefore constraining the rotation matrix. With this constrained, the problem converts to an algebraic problem, and not a linear transformation problem, thus increasing the speed of the algorithm. The same algorithm used to calculate pitch is used to calculate the angle created from the center of the target to the camera. This sets up a right triangle, and simple trigonometry is used to calculate distance. The final results yields distance on the (X, Y) plane, as well as the pitch of the target.

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