ABSTRACT

Many lens distortion models are exists with numerous differences and every distortion model is evaluated with various methods. The distortions are aberrations occur by the existence of a lens. There are two types of distortions that occur in imaging systems which in specific circumstances may affect an image's geometry without debilitating quality or diminishing the information existing in the image are the radial distortion which represents high distortion while the other type is the tangential distortion. In this thesis the concentration is on the radial distortion only, since there is no much knowledge with genuine cameras that present tangential distortion.

An algorithm is proposed to select automatically the best distortion model for thin lens of effective focal length 30.64 mm using statistical information criterion, and compute the inverse value of the chosen model using an exact formula.

The result shows that the 6^{th} order radial distortion model is the best model with the minimum error about - 0.273for lens of focal length 30.64 mm using Minimum Description Length criteria MDL, while at 4^{th} order the minimum error about - 0.177, and at 2^{nd} order about - 0.112.

The algorithm shows good results in minimizing the distortion coefficient using the high order term of polynomial expression without losing the accuracy, also using lenses with low distortion could achieve high stability and accurate result of the inversion process.