

基于图像旋转投影的导航路径检测算法 Navigation Line Detection Arithmetic Based on Image Rotation and Projection

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摘要: 提出一种农业车辆视觉导航路径识别算法——旋转投影算法。该算法通过角度枚举对图像ROI实施旋转变换,由旋转后图像的列均值与枚举角度构成旋转投影矩阵R,对其行向量实施差分运算得到差分旋转投影矩阵Rd,由Rd的极值可确定图像导航路径,即航向偏差 θ 与航位偏差d,进而可以求得世界坐标系下的导航路径参数。同理可以对田头线进行检测。为了提高算法的实时性,提出设定合理的ROI、实施线性压缩、旋转角度先粗分再细分的二步法以及充分利用前帧信息4种处理方法,使处理一帧用时6.2ms左右。通过对不同条件下成熟小麦图像测试表明,该算法识别导航路径准确率达到95%。A new tractor navigation line detection arithmetic, named rotation and projection arithmetic, was put forward. At first, the image ROI rotates a series of given angles and for each rotation the ROI's column average values were computed. And then the column average values and the enumeration angles compose the rotation and projection matrix R. Through all row vectors difference operation in R the difference rotation and projection matrix Rd was attained by whose extremum values the image navigation line parameters can be found out (including heading angle and lateral position). Finally the world coordinate guidance line parameters were attained by those parameters. By using the same principle the field end line can also be detected. In order to make the arithmetic more efficient, there are four measures to be used: setting appropriate ROI, utilizing linear reducing, starting as rough-divisitory rotation angle and then elaborate-divisitory rotation angle, using the former frame information. Those measures make one frame processing time in 6.2ms or so. Using various mature wheat images testing indicates that the precision rate of recognizing navigation line is up to 95%.

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