归一化积相关算法并行加速方法研究及 FPGA 实现

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摘　要：归一化积相关算法在地形匹配、目标识别等图像处理中有着广泛的应用，但由于其计算过程复杂，计算实时性较差，限制了它的应用范围，本文结合 FPGA 在并行计算方面的优势，提出了一种归一化积相关 16 路并行计算方法及硬件实现架构，具有精度高、速度快的特点，并在 FPGA 上进行了实现，与 PC 机 MATLAB 软件和 DSP 芯片 TS201 相比，运算速度提升了上千甚至上万倍，计算精度能够达到 10-6，能够满足地形匹配及目标识别等图像处理的实时性和计算精度要求.

关键词：归一化积相关算法；16 路并行计算；硬件加速

Research of parallel acceleration method and implementation

of normalized product correlation with FPGA

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Abstract： Normalized product correlation method is widely used in image processing filed, such as terrain matching and target recognition, and has limited application for complex computational process and insufficient real-time performance.In this paper, a 16-channel normalized product correlation parallel computing method and hardware architecture are proposed based on the advantages of FPGA in parallel computing. It is implemented on the FPGA and has the characteristics of high precision and fast speed.Compared with the PC MATLAB software and DSP chip TS201,the computing speed is increased by thousands or even tens of thousands of times,and the computing accuracy can reach 10-6, which can meet the real-time and precision and precision requirements of image processing such as terrain matching and target recognition.

Key words： normalized product correlation; 16-channel parallel computing; hardware acceleration

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