



北京理工大学

数学与统计学院学术报告

Vertex-frequency analysis on directed graphs

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摘要: Vertex-frequency analysis (VFA) is a useful technique in graph signal processing. It can extract the correspondence between frequencies and vertices. VFA can be calculated by the windowed graph Fourier transform and the localized graph Fourier transform. But the two approaches are confined to undirected graphs. In order to address the absence of VFA on directed graphs, we extend the fundamental concepts of VFA to directed graphs. We first propose windowed directed graph Fourier transform based on the shifted window function in vertex domain. The relevant properties, reconstruction formulas, and simulation results of vertex-frequency representation are given. Then, we propose the localized directed graph Fourier transform, where the band-pass transfer filters can capture the localized spectral domain. Furthermore, we present a polynomial approximation technique to decrease computational cost. Finally, we evaluate the proposed directed VFA framework with two kinds of applications, clustering and malfunction detection.

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