计算机工程与应用 2010 46 (5): 1-3 ISSN: 1002-8331 CN: 11-2127/TP

博士论坛

半指导的核聚类检测网络社团方法

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收稿日期 2009-11-2 修回日期 2009-12-17 网络版发布日期 2010-2-8 接受日期

摘要 近年来，复杂网络中的社团发现越来越受到研究人员的关注并且许多方法被提了出来。在这种背景下，最近李等人提出了一种用来评估社团质量的函数，称之为模块密度函数（即*D*值）。该函数显示了较高的*D*值对应于较好的社团结构，然而，优化该函数是一个NP难问题。通过模块密度函数*D*的半指导聚类优化，论证了模块密度函数的半指导聚类与核*k*方法的等价性并提出了一种新的半指导核聚类检测复杂网络社团方法。在一个经典的计算机产生的随机网络中检验了该算法，并与基于模块密度的直接核方法做了比较。特别地，当网络中社团结构变得模糊时，实验结果显示这种新的算法在发现复杂网络社团上是有效的。

关键词 复杂网络 社团结构 模块密度 核方法 半指导聚类

分类号 TP399

Kernel approach for detecting communities in complex networks based on semi-supervised clustering

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Abstract

In recent years，the problem of community structure detection has attracted more and more attention and many approaches have been proposed.In this context，Li et al recently propose modularity density objective function for community detec-
ting called the *D* function.Empirically，higher values of the *D* function have been shown to correlate well with good community structures.However，optimization of the function is a NP-hard problem.In this paper，how to optimize the *D* function can be formulated as a semi-supervised approach problem.The equivalence of the semi-supervised and the kernel *k*-means based on modularity density are also proved and a new semi-supervised kernel clustering approach is proposed.The approach is illustrated and compared with direct kernel approach based on modularity density by using a classic computer generated networks.Experimental results show the significance of the proposed approach，particularly，in the cases when community structure is obscure.

Key words complex networks community structure modularity density kernel approach semi-supervised clustering

DOI: 10.3778/j.issn.1002-8331.2010.05.001

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