Node classification in a multilayer network

Many real-world processes can be represented as multilayer networks (graphs), for instance, scientist's social network.

The problem

to investigate the possibility of accurate node classification using label propagation algorithms.

Boundary-based heat diffusion classifier

Algorithm uses the intuitive and natural model of a physical heat diffusion system with boundary conditions.

The solution

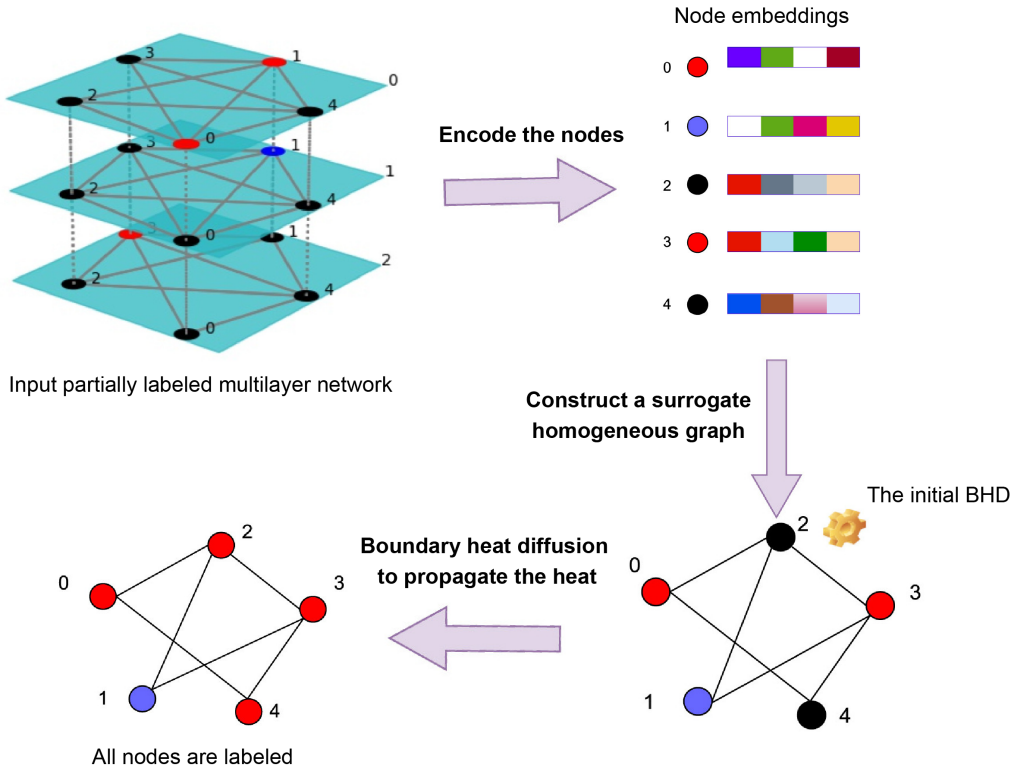
1) provide an approach for combining the graph embedding and the diffusion method in a multilayer network,
2) show that transductive semi-supervised kernel is the limit case of BHD,
3) develop an iterative method to BHD.

Boundary heat diffusion classifier[1]

The solution approach:

$\mathcal{N} = L \cup U,$
K layers, $G_k = (\mathcal{N}_k, E_k),$
$E_k \subseteq \mathcal{N}_k \times \mathcal{N}_k, \mathcal{N}_k \subseteq \mathcal{N}$

Heat diffusion:
$\frac{\partial f(x,t)}{\partial t} - \Delta f(x,t) = 0$



[1] *M. Timilsina, et al.* Boundary heat diffusion classifier for a semi-supervised learning in a multilayer network embedding // Neural Networks, 2022.