

Consensus Problems in Networks of Agents with Switching Topology and Time-Delays

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分享暨个人总结

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Some Basic Notations

- 邻接矩阵
 - 邻居节点
 - 决策值
 - χ -一致性问题
 - 平均/最大/最小一致性
- $\mathcal{A} = [a_{ij}]$
 - N_i
 - α
 - χ
 - Ave(x)/Max(x)/Min(x)

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Model Consensus Protocols

CT Model

$$\dot{x}_i = u_i(t)$$

DT Model

$$x_i(k+1) = x_i(k) + \epsilon u_i(k), \epsilon > 0$$

A1 Zero Communication Time-Delay

$$u_i = \sum_{j \in N_i} a_{ij}(x_j - x_i)$$

A2 Communication Time-Delay $\tau_{ij} > 0$

$$u_i(t) = \sum_{j \in N_i} a_{ij}[x_j(t - \tau_{ij}) - x_i(t - \tau_{ij})]$$

Laplacians

$$l_{ij} = \begin{cases} \sum_{k=1, k \neq i}^n a_{ik}, & j = i \\ -a_{ij}, & j \neq i \end{cases}$$

A1 State Evolves

$$\dot{x}(t) = -Lx(t)$$

A1 State Evolves with Switchin Topology

$$\dot{x}(t) = -L_k x(t), \quad k = s(t)$$

A1 DT

$$x(k+1) = P_\epsilon x(k), \quad P_\epsilon = I - \epsilon L$$

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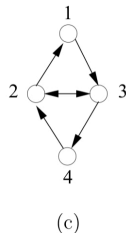
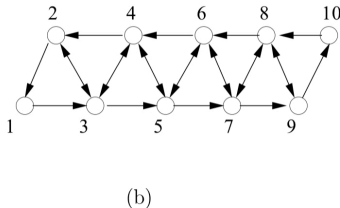
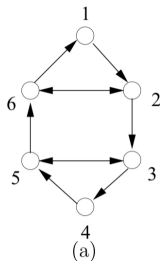
Balanced Graph

Balanced Node

$$\deg_{out}(v_i) = \deg_{in}(v_i)$$

Balanced Graph

$$\deg_{in}(v_i) = \sum_{j=1}^n a_{ji}, \quad \deg_{out}(v_i) = \sum_{j=1}^n a_{ij}$$



$$L = \mathcal{L}(G) = \Delta - \mathcal{A}$$

Δ (degree matrix) $\text{diag}(\deg_{out}(v_i))$

\mathcal{A} (adjacency matrix) $\{0,1\}$

w_r

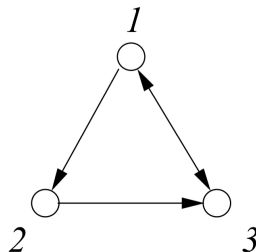
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SC (Strongly Connected)

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Counterexample



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一致性协议

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