

**Appendix. Pot-luck challenge: FACT SHEET.***(for a task solved)***Title:** Discover a Local Causal Network around a Target with a Given Depth**Participant name, address, email and website:**

You Zhou,                               zhouyou@pku.edu.cn  
 Changzhang Wang,                   changzhang@pku.edu.cn  
 Jianxin Yin,                           jianxinyin@gmail.com  
 Zhi Geng,                              zgeng@math.pku.edu.cn  
*School of Mathematical Sciences, Peking University*  
*Beijing 100871, China*

**Task solved:** LOCANET**References**

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**Method:**

we propose an algorithm for discovering a local causal network around the target  $T$  which has a radius of length  $k$  from  $T$ . Our algorithm extends the PCD-by-PCD algorithm for prediction with intervention presented in Yin et al. (2008). First our algorithm construct a depth  $k$  local network by computing the PCDs of nodes whose distance from  $T$  is less than  $k$ .

Second, our algorithm continues to find PCDs along only some pathes away from the target which are necessary to orient the undirected edges within the depth  $k$  local network. Finally, we obtain a local network which is the same as the result even if we continue to compute the global network.

**Results:**

We summarize our results of for the challenge task LOCANET in Table 1. ‘NoNode’ denotes the number of nodes for a data set, ‘NoNodeLN’ denotes the number of nodes in the local network around the target with depth 3’, ‘NoPcds’ denotes ‘the number of PCDs found in our algorithm, and we give CPU times for every data set.

Data set	NoNodes	NoNodeLN	NoPcds	CUP time
REGED	1000	136	212	10 minutes
CINA	133	108	116	4 hours
MARTI	1025	224	309	10 minutes

Table 1: Summary of our results for the Challenge task: LOCANET.

Dataset	Score
REGED	0.502503
SIDO	3.30924
CINA	2.1707
MARTI	0.93278

Table 2: Score for LOCANET.

Advantages of our approach: First, our algorithm has a more efficient stop rule than the PCD-by-PCD algorithm(Yin et al. (2008)). In PCD-by-PCD algorithm, a main stop condition is ‘until all edges connecting the target are oriented’, but in our algorithm, we make this condition weaker so that our algorithm can stop earlier than PCD-by-PCD algorithm without loss of validity. Second, our algorithm continues to find PCDs along only some pathes away from the target which are necessary to orient the undirected edges within the depth  $k$  local network, while Yin’s algorithm continues to find PCDs along all pathes away from the target.

**Keywords:** Causal network, Local structural learning