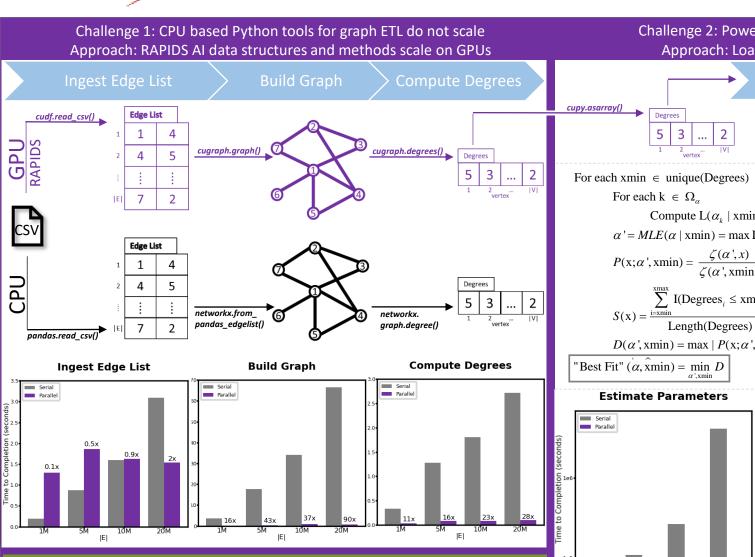
Using RAPIDS AI to Accelerate Graph Data Science Workflows



T. Hricik¹. D. Bader¹. O. Green²

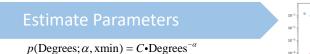
1) Ying Wu College of Computing, New Jersey Institute of Technology 2) NVIDIA Corporation



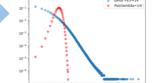


*This work was partially funded by D. Bader's NVIDIA NVAIL Award

Challenge 2: Power-law parameter estimation requires 2-dimensional grid search Approach: Load cudf series Degrees as CuPy array and compute on GPUs



 $C = \zeta(\alpha, xmin)^{-1}$ $\zeta(\alpha, \text{xmin}) = \sum_{i=1}^{n} (i + \text{xmin})^{-\alpha}$



For each xmin \in unique(Degrees)

Compute $L(\alpha_{\iota} \mid xmin)$

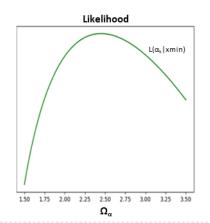
 $\alpha' = MLE(\alpha \mid xmin) = max L(\alpha_{\iota} \mid xmin)$

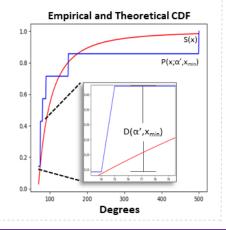
$$P(x; \alpha', xmin) = \frac{\zeta(\alpha', x)}{\zeta(\alpha', xmin)}$$

$$I(x) = \frac{\sum_{i=x\min}^{x\max} I(Degrees_i \le x\min)}{I(x)}$$

 $D(\alpha', xmin) = max | P(x; \alpha', xmin) - S(x)|$







- [1] B. Huberman, L. Adamic, "Growth dynamics of the world-wide web," Nature, vol. 2, 1999, p.131.
 - [2] N. Gong, W. Xu, "Reciprocal versus parasocial relationships in online social networks," Springer Social Network Analysis and Mining (SNAM), 4(1), 2014.
 - [3] Clauset A., Shalizi, C.R., Newman, M.E.J., "Power-law distributions in empirical data.", SIAM Review, 51, 2009, pp. 661-703.
 - [4] Bauke, H., "Parameter estimation for power-law distributions by maximum likelihood methods", Eropean Physical Journal B 58, 67, 2007, pp. 167-173.
 - Gong, N.Z., Xu, W., Huang, L., Mittal, P., Stefanov, E., Skar, V. Song, D., "Evolution of socialatrribute networks: measurements, modeling, and impllications using Google+", ACM Workshop on Social Network Mining and Analysis (SNA-KDD), co-located with KDD, 2012.
 - M. Kutner, C. Nachtsheim, J. Neter, Applied Linear Regression Models, 4th ed., McGraw-Hill Irwin: New York, 2004, pp. 100-118.