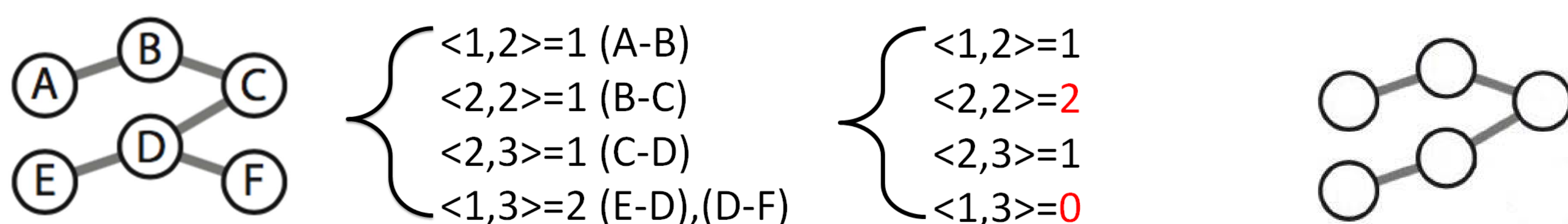# Local Differential Privacy Preserving in Social Networks
Student: Tianchong Gao; Advisor: Feng Li
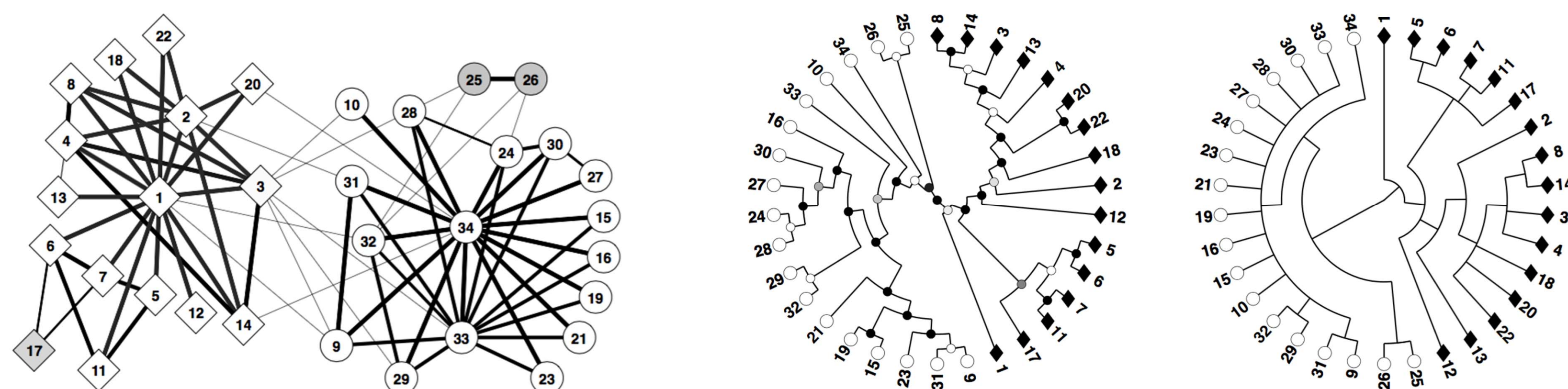
Pervious differential privacy mechanism:

A) dK-2 series [1]

$<1,2>=1$ (A-B)
$<2,2>=1$ (B-C)
$<2,3>=1$ (C-D)
$<1,3>=2$ (E-D),(D-F)

$<1,2>=1$
$<2,2>=2$
$<2,3>=1$
$<1,3>=0$

1) Original graph   2) dK-2 series 3) Perturbed dK-2 series 4) Perturbed graph

B) HRG model[2]

1) Original graph   2) Probable HRGs

Motivation:
Preserve privacy
Analysis human social relationships
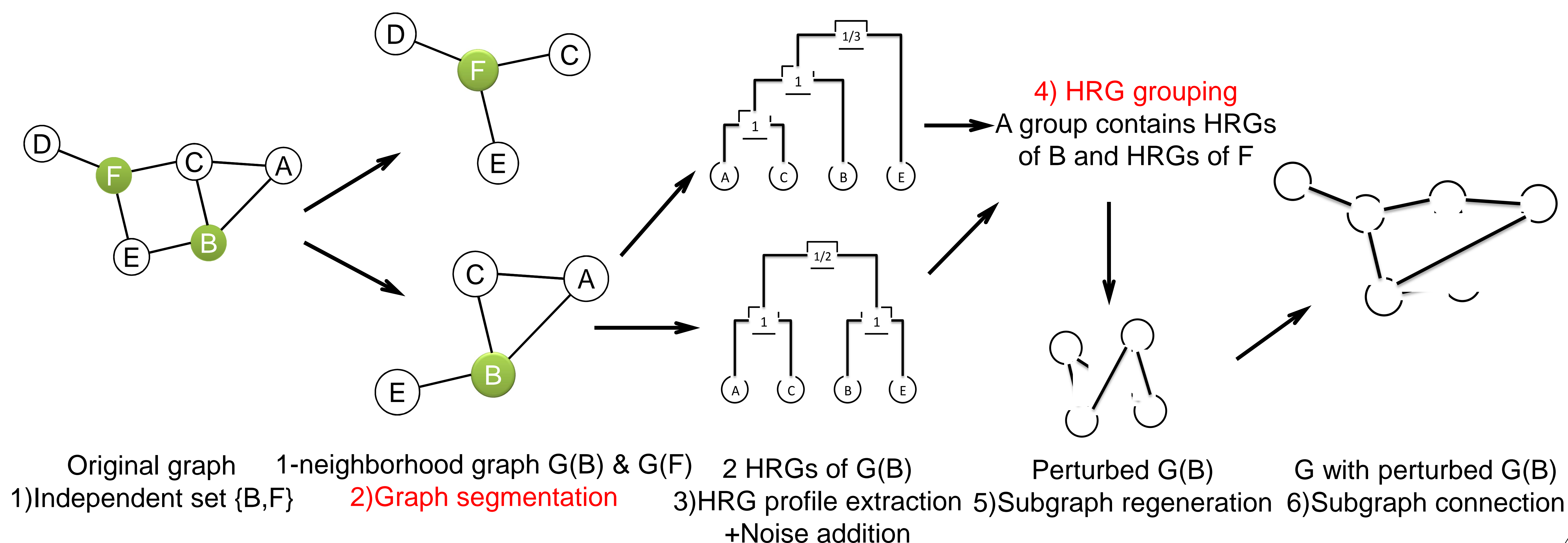Feed advertisements
Evaluate effectiveness of applications

Advantages:
All:
Strong privacy guarantee
Able to regenerate perturbed graph

Problems:
dK-2:
Hard to regenerate
Break the clustering information
HRG:
Each dendrogram has low probability
All:
Large noise scale

Our Scheme:

4) HRG grouping
A group contains HRGs
of B and HRGs of F

Original graph   1-neighborhood graph G(B) & G(F)   2 HRGs of G(B)   Perturbed G(B)   G with perturbed G(B)
1)Independent set {B,F}   2)Graph segmentation   3)HRG profile extraction 5)Subgraph regeneration 6)Subgraph connection
                                                           +Noise addition

Reference:
[1] SALA, A., ZHAO, X., WILSON, C., ZHENG, H., AND ZHAO, B. Y. Sharing graphs using differentially private graph models. In IMC (2011).
[2] A. Clauset, C. Moore, and M.E.J. Newman. Structural inference of hierarchies in networks. arXiv:physics/0610051, October 2006.

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