

Supplementary File 3 - Illustrating the PageRank-based approach with synthetic data

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To illustrate, we consider the following example including five genes $\{g_1, \dots, g_5\}$ whose differential expression is determined for six signals, $\{S_1, \dots, S_6\}$, each including seven experiments. Table 1 includes the proportion of experiments (*i.e.*, frequencies) in which gene g_i , $1 \leq i \leq 5$ is found to be differentially expressed under signal S_j , $1 \leq j \leq 6$.

Table 1 Genes over signals, representing relative frequencies of the significantly expressed genes

Genes	S1	S2	S3	S4	S5	S6
g1	0.29	1	0.14	1	0.57	0.29
g2	0.14	1	0.43	0.71	0.14	0.57
g3	0.71	0	0.86	0.43	0.29	0.86
g4	1	0.57	0.71	0.86	0.86	1
g5	0.86	0.29	0.57	0	1	1

The transition matrices of the random walks are given in Tables (2–6). They are obtained from Table (1) and networks in Figure (1) (in the main text), by the PageRank algorithm, which are row-wise normalized.

Table 2 The transition Matrix for g_1

Matrix, g_1	S1	S2	S3	S4	S5	S6
S1	0	0.333	0.047	0.333	0.190	0.097
S2	0.127	0	0.061	0.437	0.249	0.127
S3	0.092	0.317	0	0.317	0.181	0.092
S4	0.127	0.437	0.061	0	0.249	0.127
S5	0.107	0.368	0.051	0.368	0	0.107
S6	0.097	0.333	0.047	0.333	0.190	0

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Table 3 The transition Matrix for g_2

Matrix, g_2	S1	S2	S3	S4	S5	S6
S1	0	0.351	0.151	0.250	0.049	0.200
S2	0.070	0	0.216	0.357	0.070	0.286
S3	0.055	0.391	0	0.277	0.055	0.223
S4	0.061	0.438	0.188	0	0.061	0.250
S5	0.049	0.351	0.151	0.249	0	0.200
S6	0.058	0.413	0.178	0.293	0.058	0

Table 4 The transition Matrix for g_3

Matrix, g_3	S1	S2	S3	S4	S5	S6
S1	0	0	0.352	0.176	0.119	0.352
S2	0.225	0	0.273	0.136	0.092	0.273
S3	0.310	0	0	0.188	0.127	0.375
S4	0.261	0	0.316	0	0.107	0.316
S5	0.248	0	0.301	0.150	0	0.301
S6	0.310	0	0.375	0.188	0.127	0

Table 5 The transition Matrix for g_4

Matrix, g_4	S1	S2	S3	S4	S5	S6
S1	0	0.142	0.177	0.215	0.215	0.250
S2	0.226	0	0.160	0.194	0.194	0.226
S3	0.233	0.133	0	0.200	0.200	0.233
S4	0.241	0.138	0.171	0	0.208	0.241
S5	0.241	0.138	0.171	0.208	0	0.241
S6	0.250	0.142	0.177	0.215	0.215	0

Table 6 The transition Matrix for g_5

Matrix, g_5	S1	S2	S3	S4	S5	S6
S1	0	0.101	0.199	0	0.350	0.350
S1	0.251	0	0.166	0	0.291	0.291
S1	0.273	0.092	0	0	0.317	0.317
S1	0.231	0.078	0.153	0	0.269	0.269
S1	0.316	0.107	0.209	0	0	0.368
S1	0.316	0.107	0.209	0	0.368	0