SUPPLEMENTAL MATERIAL: Influencers identification in complex networks through reaction-diffusion dynamics

I. SUPPLEMENTARY FIGURES AND TABLES

FIG. S1. Contact-network spreading model: a comparison between nodes centrality and node spreading ability \( q \) in the real networks analyzed in the main text. Each panel shows the Pearson linear correlation \( r \) between nodes centrality and nodes spreading ability \( q \). Differently from the main text (Fig. 3 and Fig. 4), the metrics considered in addition to ViralRank (\( v \)) are PageRank (\( \pi \)), with dumping parameter \( c = 0.85 \) and degree centrality (\( k \)). Results are for: (a) 9/11 terrorists, (b) email, (c) jazz collaborations, (d) network scientists co-authorships, (e) protein interactions and (f) Facebook friendships. The PageRank performance is qualitatively similar but always worse than that of the degree centrality.
FIG. S2. Contact-network spreading model: a comparison between nodes centrality and nodes spreading ability $q$ in real networks. Pearson linear correlation between nodes centrality and $q$ as a function of $\beta/\beta_c$ for six additional datasets: (a) karate club friendships, (b) dolphins interactions, (c) characters co-appearances in the novel 'Les Miserables', (d) C.elegans neural connections, (e) U.S. domestic flights and (f) U.S. powergrid supply lines. The structural properties of these networks, and of all other datasets, are reported in Table S1.
FIG. S3. Correlation in the full parameter space $(\beta, \mu)$ for 9/11 terrorists network.

FIG. S4. Correlation in the full parameter space $(\beta, \mu)$ for jazz collaborations network.

FIG. S5. Correlation in the full parameter space $(\beta, \mu)$ for network scientists co-authorships network.
FIG. S6. Correlation in the full parameter space ($\beta, \mu$) for protein interaction network.

FIG. S7. Correlation in the full parameter space ($\beta, \mu$) for Facebook friendships network.

<table>
<thead>
<tr>
<th>Dataset</th>
<th>$N$</th>
<th>$L$</th>
<th>$D$</th>
<th>$C$</th>
<th>$\langle k \rangle$</th>
<th>$\langle k^2 \rangle$</th>
<th>$\beta_c$</th>
<th>$\beta_u / \beta_c$</th>
<th>Ref.</th>
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<tr>
<td>Karate</td>
<td>34</td>
<td>78</td>
<td>5</td>
<td>0.57</td>
<td>4.59</td>
<td>35.65</td>
<td>0.1477</td>
<td>2.50</td>
<td>[1]</td>
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<td>Terrorists</td>
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<td>152</td>
<td>5</td>
<td>0.49</td>
<td>4.90</td>
<td>40.03</td>
<td>0.1396</td>
<td>2.50</td>
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<td>Dolphins</td>
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<td>159</td>
<td>8</td>
<td>0.26</td>
<td>5.13</td>
<td>34.90</td>
<td>0.1723</td>
<td>2.00</td>
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<td>LesMiserables</td>
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<td>5</td>
<td>0.57</td>
<td>6.60</td>
<td>79.53</td>
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<td>5</td>
<td>0.59</td>
<td>38.92</td>
<td>2508.78</td>
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<td>6.50</td>
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<td>1070.24</td>
<td>0.0266</td>
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<tr>
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<td>5</td>
<td>0.29</td>
<td>14.04</td>
<td>365.70</td>
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<td>0.74</td>
<td>1.15</td>
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<td>2.00</td>
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<tr>
<td>U.S. Flights</td>
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<td>2580</td>
<td>7</td>
<td>0.62</td>
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TABLE S1. Structural properties of all the datasets analyzed. The different columns are the number of nodes and links $N$ and $L$, the diameter $D$, the global clustering $C$, the first and second moment of the degree distribution $\langle k \rangle = 1/N \sum k_i$ and $\langle k^2 \rangle = 1/N \sum k_i^2$ and the epidemic threshold $\beta_c$; the last two columns are the upper-critical value $\beta_u$ above which ViralRank outperforms all the other metrics and the data source, respectively.