Quantifying Narratives: A Comparative Social Network Analysis of Upin & Ipin Across Series and Film

Keywords: social network analysis; interactions; Upin & Ipin; character network; animated media

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Extended Abstract

Motivation. Character interactions form the structural foundation of narrative media, influencing prominence, community organisation and plot progression. Although the use of social network analysis in television and films has grown, there is still limited comparative work across episodic and cinematic formats within the same franchise, especially in Southeast Asian media contexts. Using the well-known Malaysian animated franchise, Upin & Ipin, this study poses the following questions: (i) How does the storytelling narrative of Upin & Ipin compare with real-world social networks or Western media? (ii) What aspects of the network underpin its narrative coherence, and can such attributes be quantitatively captured? Addressing these questions advances the mathematical understanding of media networks and sheds light on how structural modelling might guide the strategic design of engaging narratives in the rapidly growing entertainment industry.

Approach and Methodology. Directed and weighted conversational character networks from the first two seasons of the series (18 episodes) and the feature film, *Geng: The Adventure Begins*, are constructed, as illustrated in Figure 1. Nodes represent characters, while directed edges encode speaker-listener interactions. A directed, Boolean-based narrative unit weighting system is used to capture interactions in order to avoid repeated exchanges within a single unit from disproportionately inflating edge weight. Episodes serve as the narrative units for the series, whereas the film is segmented into fixed five-minute intervals to allow for cross-format comparability. Global network statistics, Walktrap community detection and centrality measures are employed to measure cohesion, clustering and character prominence. Role hierarchies are derived from weighted degree centrality as a direct measure of interaction persistence, while a degree-preserving configuration null model is applied to determine whether observed structural prominence surpasses random expectations.

Results. The character networks exhibit structural features consistent with real-life social patterns, showcasing decentralised connectivity that contrasts with the egocentric topology reported in prior studies of Western media. Narrative coherence is quantitatively reflected through centrality patterns, where high betweenness characters serve as structural bridges between central and peripheral groups, while antagonists exhibit limited centrality. Comparative analysis highlights increased intricacy of interactions in the film relative to the series, with non-random character placements indicating shifts in narrative strategies. Both the series and film networks deviate from null model expectations, suggesting that these structures cannot be attributed to random connectivity alone.

Conclusions and Outlook. Overall, the study demonstrates how social network analysis may be systematically applied to quantitatively evaluate fictional narratives, uncovering hidden character dynamics through a culturally grounded case study. Future research could extend the present methodology to other animated universes or incorporate dynamic network modelling to track relationship evolution.

Ethics Statement. This article does not contain any studies with human participants performed by any of the authors. Therefore, no ethics approval was required.

References

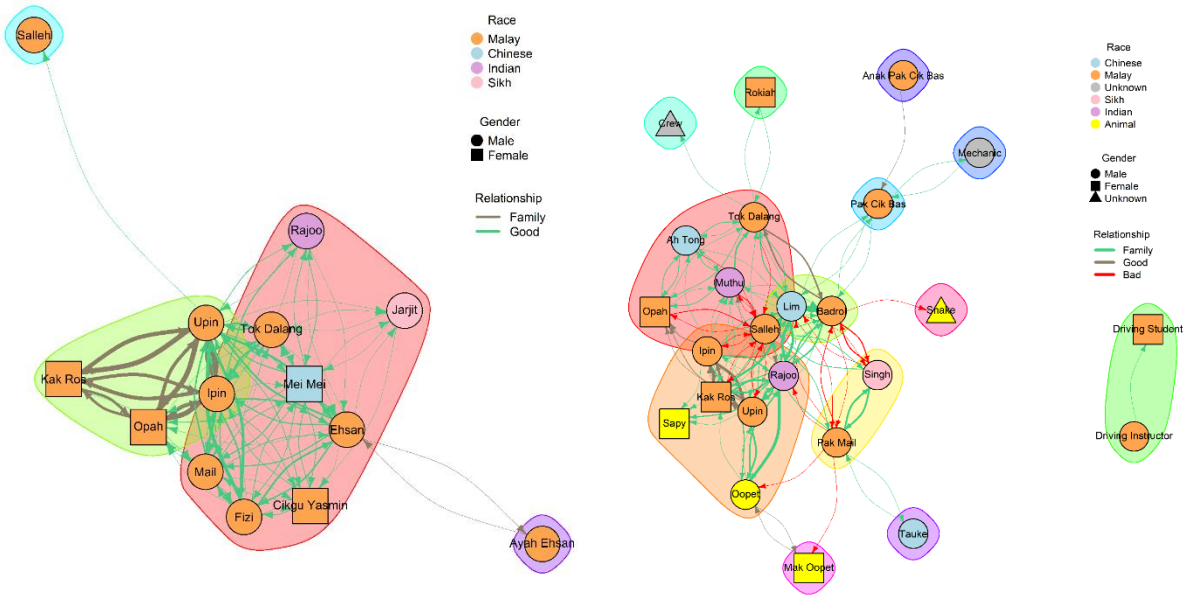
[1] Bazzan, A. L. C. I will be there for you: Clique, character centrality, and community detection in Friends. *Computational and Applied Mathematics* **39**, 192; 10.1007/s40314-020-01222-7 (2020).

[2] Dellow, A. A. & Razak, F. A. Social Networks in the Upin & Ipin Universe: Comparative Analysis of a Series and Movie in Southeast Asian Media. *Research Square Preprint* (Version 1); 10.21203/rs.3.rs-6329035/v1 (2025). **Revised version currently under review at *Scientific Reports*.**

[3] Labatut, V. & Bost, X. Extraction and analysis of fictional character networks. *ACM Comput Surv* **52**, 1–40; 10.1145/3344548 (2019).

[4] Park, S.-B., Oh, K.-J. & Jo, G.-S. Social network analysis in a movie using character-net. *Multimed Tools Appl* **59**, 601–627; 10.1007/s11042-011-0725-1 (2012).

[5] Schauf, A. & Escobar Varela, M. Searching for hidden bridges in co-occurrence networks from Javanese wayang kulit. *Journal of Historical Network Research* **2**, 26–52; 10.25517/jhnr.v2i1.42 (2018).



(a) (b)

Figure 1. **Directed and weighted conversational networks for (a) the television series and (b) the film adaptation with Walktrap community detection.** These integrative visualisations show narrative structure by combining several layers of information, where node colours denote race, node shapes indicate gender, edge directions represent conversational flow, edge weights reflect interaction strength and edge colours distinguish familial, positive and negative relationships. The figures are intentionally information-rich to facilitate exploratory interpretation of character roles and narrative organisation.