Investigating the Character-Network Topology in Marvel Movies

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INTRODUCTION

Movies by Marvel Entertainment have seen unprecedented commercial success over the years. The characters such as Spiderman, Hulk or Iron Man, have become household names. Marvel Cinematic Universe's major break came in 2008 after the release of Iron Man and during the last decade, in particular, it has catapulted itself to becoming one of the most successful franchises in the history of film history. Known as the Marvel Cinematic Universe, this media franchise has had its own journey of successes and failures of over 80 years.

In the recent years Social Network Analysis has been applied extensively to understand relationship between entities. A simple relationship could be constructed between any two entity if there is some sort of association between them. This association must be defined, and a connection is then established between them. Several such connections form the network and the network could be then analysed at both the node-level and the network-level.

Martin Goodman started Marvel comics (at that time known as Timely Comics) in 1939. The first comics were a crossover between characters like Namor and the Human Torch. During the time of World War II people wanted to see patriotic heroes, hence characters like Captain America took prominence. In the 1950s, Timely Comics changed its name to Atlas Comics. Stan Lee and Jack Kirby partnered together to make characters like Spiderman, Iron Man, dare devil, fantastic four (team). The characters became more successful commercially than DC (another media franchise) because of team characters like Avengers and X-Men. However, during the 90s they had to suffer bankruptcy as audience were starting to prefer themes where politics and more violence were preferred. During this time they only depended on characters like Punisher, Deadpool, Wolverine and Venom. Marvel Studios had to sell some of the character rights to New World Entertainment. From 2000 onwards they started to make movies like Blade, X-Men, Daredevil and Spiderman. In 2009, after Iron Man and the Incredible Hulk were released, Walt Disney Studios bought Marvel Entertainment. From 2010 onwards they started Marvel Studios and since then on have produced some 22 movies under the franchise.

Our study was driven to find answers to questions like which of the Marvel characters are best connected, holding this famed character-network together; which characters form the bridge and which characters have been a major success both on the yardstick of user ratings and commercial success. To answer these questions, Social Network Analysis is carried out to calculate graph metrics and visualizations. SNA makes it possible to analyse relationships based on the quality (influence, prestige) and quantity (bonding and degree) of connections they form. We also carry out a 2-mode analysis to understand the structure of characters in affiliation to the movies there have starred in.

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BACKGROUND

Extant literature has looked at several aspects of implementing social network analysis on character interactions. Ding and Yilmaz (2010) used statistical learning to estimate the affinity of characters in movies. Social Network analysis then identified leaders in the communities they formed. Weng, Chu, and Wu (2009) investigated the perspective of social relationships in movies. Using a specially designed method called RoleNet, the authors extract relationships and construct role's social network, thereby leading to identification of corresponding communities. The study was further able to prove the superiority of 'social-based story segmentation approach' over other conventional methods. Using global face name matching Zhang, Xu, Lu, and Huang (2009) identified characters in films and the relationship between characters were mined by applying Social network analysis. A recent study by Lv, Wu, Zhu, and Wang (2018) used a model called as StoryRoleNet to determine relationship among roles. Their study also analysed networks constructed using video and subtitle text.

Audio-visual features are used to analyse movie videos. In addition, constructing networks using co-appearance in movies is often the practice. A study by Ding, Yilmaz, and Ieee (2011) attempts to establish a relationship between visual concepts and social connections between actors. Using a graphical model and experimenting on Youtube videos and theatrical movies, the authors were able to establish relation between actors and also detect communities they form. Park, Oh, and Jo (2012), however, found dialog to be better at constructing social networks, in addition to identifying the quantum of roles (leading, minor, extras), among others. The authors proposed a method called as 'Character-net' to achieve this and also found this to be effective in detecting sequences.

Social network Analysis has been used for movie summarization. Using network analysis, Tran, Hwang, Lee, and Jung (2017) identified protagonists and the other characters and then related them to one another (which the authors call as 'Character Network Analysis') to have a movie summary as close as the original one.

FOCUS OF THE ARTICLE

Most of the studies above, however, have used character roles and relationships within a movie to construct relationships. Rarely have studies looked at character in a movie as a distinct entity which relates to another entity - that may be either a movie, if they have starred in that movie; or another character if they have co-starred in a movie together. Relationships constructed this way could reveal, for example, the best-connected characters or the most 'bridge-forming' characters, at the entity level, and the sparseness of the network or formation of giant component or small world characteristics at the socio-centric level. Our study thus fills this gap in literature by adding the missing dimension.

We have used Marvel Movie production movies as a case study here to investigate network properties of character network. Here we are not interested in understanding association based on what relationship a character has in a particular movie (i.e. father-mother, friend, married couple, love interest, etc.), but rather base it on how we define a common format of relationship. This is done in 2 ways – in the first format of relationship (2-mode) we construct a relationship between a movie and character, if the character has starred a movie (relationship). Hence all the prominent characters (entity) in a movie will tie up with the movie (entity). In the second format (1-mode), a tie or relationship is constructed if the characters have featured in a movie together. A relation is thus seen from purely these two perspectives and topology of the network formed are then investigated.