

Analysing The Marvel Comic Book Universe: Network and Relationships to the Nth Degree

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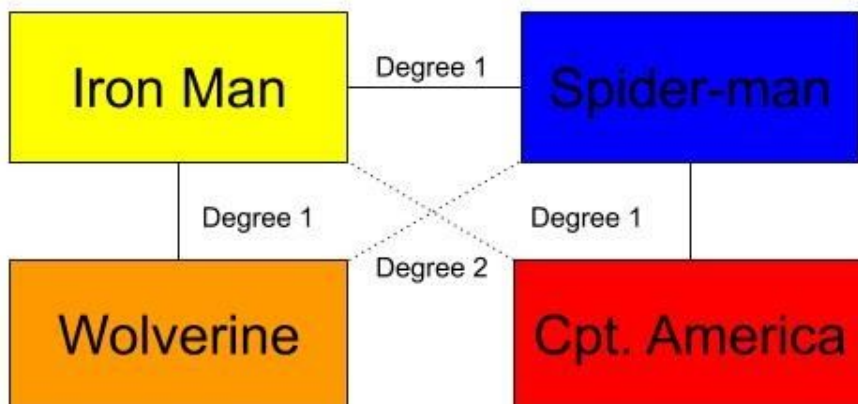
SYNOPSIS

To understand the complex and deep relationships between characters in the Marvel Comic Book Universe based on which comics characters appear together.

MOTIVATION

Being huge Marvel Cinematic Universe fans we wanted to do something with the character network in Marvel. Given that there are not as many movies as there are comics, we decided to use the comic book universe instead, for more data and more of a challenge. There are many characters that we have not heard of and many that we are quite fond of, so we want to understand how these characters may or may not know each other. Furthermore we want to know which characters are friends and which are friends of friends by creating a network based on which comics they have been in together.

To help us better understand the Marvel Comic Book network we will treat characters that are in the same comics together as friends of degree one. Friends that are in a comic book together but are in a comic book with a character that is not mutual will have a degree two friendship, and so on. To clarify, let's look at 4 characters as an example: Lets say Iron Man and Spider-man are in a comic together. They have a degree 1 friendship, also Iron Man is in a comic with The Wolverine, and Spider-man is in a comic with Captain America. Iron Man is not in a comic with Captain America and likewise Spider-man is not in a comic with The Wolverine. Then we can say Spider-man has a degree two friendship with The Wolverine since he has a degree one friendship with Iron Man and vice versa. This will be how all relationships of degree n are determined.



DETAILS

Marvel Network files:

- <http://bioinfo.uib.es/~joemiro/marvel.html>

Language:

- Python 3

IDE:

- Pycharm by JetBrains

Technical:

To solve this problem we will need to take some mathematical shortcuts as solving this in a brute force method will take a VERY long time. To speed up the calculations we will use some Linear Algebra and Graph Theory techniques.

- Graph Theory:
 - This will be based on matrices beginning with a matrix of degree 1 relationships. Graph theory suggests that any relational matrix if squared M^2 will result in a relational matrix of degree 2 relationships. Similarly if we cube the relational matrix M^3 this will result in a relational matrix of degree 3 relationships. This can be done for any degree relationships we wish to find.
- Linear Algebra:
 - Matrix multiplication is a very heavy computational process. Since we will be dealing with large matrices we may have to optimize this multiplication somehow. We will look into matrix multiplication shortcuts to make these calculations faster. Possibly diagonalizing our matrices with $A = PDP^{-1}$.