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## Relazione Caso di Studio del progetto di Ingegneria della Conoscenza

Repository : <https://github.com/lucevito/Ingegneria-della-Conoscenza.git>

**Obiettivo :** creare un sistema di raccomandazione usando il Collaborative Filtering e Content based filtering in base al nome dell'anime richiesto o selezionando i generi voluti usando 4 tecniche per eseguire Content based filtering

**Obiettivo secondario :** il confronto delle tecniche usate nel content base filtering considerando il tempo richiesto per l'elaborazione dei dati, tale test sfortunatamente risulta non valido al 100% , in quanto richiede un uso superiore della ram a disposizione della macchina con cui tale programma è stato sviluppato.

Per tale motivo il database o la tecnica usata in alcuni test sono stati limitati ma consentono comunque di ottenere un'idea della differenza di complessità richiesta fra le varie tecniche ed il loro relativo tempo per l'elaborazione

### Strumenti usati

Per eseguire ottenere attraverso il nome una raccomandazione viene usato il k-nearest neighbors (i primi k-vicini) per il Collaborative Filtering , tf-idf (term frequency-inverse document frequency) e la similarità del coseno per il Content based filtering

Per eseguire ottenere attraverso un insieme di generi una raccomandazione viene usato Random Forest Classifier(classificatore di foresta casuale) , Support Vector Classifier (classificatore a vettore di supporto), Bagging classifier usando k-nearest neighbors e Bagging classifier usando Decision Tree Classifier(albero di decisione)

### Guida all'uso

Per facilitare l'uso del programma vi è presente un nome ed un modello di generi per poter testare il programma anche se non si è a conoscenza di un nome o dei generi di un anime

Il programma dopo il caricamento e la preparazione dei dati consentirà all'utente di poter scegliere come ottenere una raccomandazione: tramite un nome o selezionando da 0 a 43 generi

Successivamente chiederà all'utente se vuole eseguire un test attraverso un nome predefinito o a dei generi predefiniti i quali corrispondono a Shingeki no Kyojin conosciuto meglio come Attack of titan

Nelle pagine seguenti sono presenti alcuni esempi d'uso

Loading data...  
Processing data....  
Enter 1 if you want to be recommended anime with Collaborative Filtering  
and Content based filtering by entering the name of an anime you know  
Enter 2 if you want to be recommended an anime by entering the genres you prefer the most  
Enter 0 if you want close the program  
If you enter something else this information will be repeat

Enter your choice : 1  
Do you want proceed with a name test : Shingeki no Kyojin a.k.a. Attack of titan ?  
Enter y for a yes, something else for no : y

Using Collaborative Filtering, the Top 10 most similar anime are :  
Warning : to reduce the use of ram,  
the size of the database will be reduced, anime with at least 500 votes will be considered

0: Shingeki no Kyojin, with distance of 0.0:  
1: Sword Art Online, with distance of 0.1335946872659557:  
2: Angel Beats!, with distance of 0.14903678429608036:  
3: No Game No Life, with distance of 0.16254528367400767:  
4: Hataraku Maou-sama!, with distance of 0.1638429001306072:  
5: Steins;Gate, with distance of 0.16728424722076785:  
6: Highschool of the Dead, with distance of 0.16957425602499732:  
7: Toradora!, with distance of 0.1752054636541328:  
8: Psycho-Pass, with distance of 0.17726396458904436:  
9: Death Note, with distance of 0.18132604001891173:  
10: Code Geass: Hangyaku no Lelouch, with distance of 0.18198153072037426:  
Time to calculate it : 0.35 seconds

Warning : to reduce the use of ram, the database size can be reduced  
based on the type of anime such as tv movies etc ..

Enter 0 for seach with all type  
Enter 1 for seach with type Movie  
Enter 2 for seach with type Music  
Enter 3 for seach with type ONA  
Enter 4 for seach with type OVA  
Enter 5 for seach with type Special  
Enter 6 for seach with type TV  
Enter your choice : 0

Using Content based filtering, the Top 10 most similar anime are :

		Anime name	Rating
0		Shingeki no Kyojin OVA	7.88
1	Shingeki no Kyojin Movie 2: Jiyuu no Tsubasa		7.75
2	Shingeki no Kyojin Movie 1: Guren no Yumiya		7.70
3	Super Robot Taisen OG: Divine Wars		6.96
4	Oni Chichi: Refresh♥		7.25
5	Saint Seiya: Meiou Hades Elysion-hen		7.82
6	One Piece		8.58
7	One Piece: Episode of Merry - Mou Hitori no Na...		8.29
8	One Piece: Episode of Nami - Koukaishi no Nami...		8.27
9	One Piece: Episode of Sabo - 3 Kyoudai no Kizu...		7.78

Time to calculate it : 3.28 seconds

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Loading data...
Processing data....
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and Content based filtering by entering the name of an anime you know
Enter 2 if you want to be recommended an anime by entering the genres you prefer the most
Enter 0 if you want close the program
If you enter something else this information will be repeat

Enter your choice : 1
Do you want proceed with a name test : Shingeki no Kyojin a.k.a. Attack of titan ?
Enter y for a yes, something else for no : no
Enter name of a anime and check if there are similar name : Death Note
    name
0      Death Note
1  Death Note Rewrite
Enter name of a anime: Death Note

Using Collaborative Filtering, the Top 10 most similar anime are :
Warning : to reduce the use of ram,
the size of the database will be reduced, anime with at least 500 votes will be considered

0: Death Note, with distance of 1.1102230246251565e-16:
1: Code Geass: Hangyaku no Lelouch, with distance of 0.133285704016314:
2: Code Geass: Hangyaku no Lelouch R2, with distance of 0.14484060443170854:
3: Angel Beats!, with distance of 0.15518707583337688:
4: Toradora!, with distance of 0.1656665782245076:
5: Elfen Lied, with distance of 0.1712963140501984:
6: Fullmetal Alchemist: Brotherhood, with distance of 0.1758883880772414:
7: Highschool of the Dead, with distance of 0.17810676635902356:
8: Suzumiya Haruhi no YUUUTSU, with distance of 0.1801093553147588:
9: Shingeki no Kyojin, with distance of 0.18132604001891173:
10: Steins;Gate, with distance of 0.18531047095276942:
Time to calculate it : 0.36 seconds

Warning : to reduce the use of ram, the database size can be reduced
based on the type of anime such as tv movies etc ..

Enter 0 for seach with all type
Enter 1 for seach with type Movie
Enter 2 for seach with type Music
Enter 3 for seach with type ONA
Enter 4 for seach with type OVA
Enter 5 for seach with type Special
Enter 6 for seach with type TV
Enter your choice : 0

Using Content based filtering, the Top 10 most similar anime are :

          Anime name  Rating
0              Death Note Rewrite  7.84
1                  Mousou Dairinin  7.74
2  Higurashi no Naku Koro ni Kai  8.41
3  Higurashi no Naku Koro ni Rei  7.56
4          Mirai Nikki (TV)     8.07
5          Nagareboshi Lens    6.79
6  Higurashi no Naku Koro ni    8.17
7          Monster           8.72
8          Bubuki Buranki    6.47
9 Higurashi no Naku Koro ni Kaku: Outbreak  7.36
```

Loading data...  
Processing data....  
Enter 1 if you want to be recommended anime with Collaborative Filtering  
and Content based filtering by entering the name of an anime you know  
Enter 2 if you want to be recommended an anime by entering the genres you prefer the most  
Enter 0 if you want close the program  
If you enter something else this information will be repeat

Enter your choice : 2  
Warning : to reduce the use of ram, the database size will be reduced  
based on the type of anime such as tv movies etc ..

Enter 1 for seach with type Movie  
Enter 2 for seach with type Music  
Enter 3 for seach with type ONA  
Enter 4 for seach with type OVA  
Enter 5 for seach with type Special  
Enter 6 for seach with type TV

Enter your choice : 6  
Select one or more genres

1 Action  
2 Adventure  
3 Cars  
4 Comedy  
5 Dementia  
6 Demons  
7 Drama  
8 Ecchi  
9 Fantasy  
10 Game  
11 Harem  
12 Hentai  
13 Historical  
14 Horror  
15 Josei  
16 Kids  
17 Magic  
18 Martial Arts  
19 Mecha  
20 Military  
21 Music  
22 Mystery  
23 Parody  
24 Police  
25 Psychological  
26 Romance  
27 Samurai  
28 School  
29 Sci-Fi  
30 Seinen  
31 Shoujo  
32 Shoujo Ai  
33 Shounen  
34 Shounen Ai  
35 Slice of Life  
36 Space  
37 Sports  
38 Super Power  
39 Supernatural

```
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21 Music
22 Mystery
23 Parody
24 Police
25 Psychological
26 Romance
27 Samurai
28 School
29 Sci-Fi
30 Seinen
31 Shoujo
32 Shoujo Ai
33 Shounen
34 Shounen Ai
35 Slice of Life
36 Space
37 Sports
38 Super Power
39 Supernatural
40 Thriller
41 Vampire
42 Yaoi
43 Yuri
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44 test with genres of Shingeki no Kyojin a.k.a. Attack of titan  
Enter 0 to stop selection, enter 50 if you want close program

Enter your choice : 44

Processing data...

Random Forest Classifier recommendation:

Warning : the maximum depth of the tree is limited to 10 in this particular test

    Anime name  
86 Shingeki no Kyojin

Time to calculate it : 1.70 seconds

Processing data...

Support Vector Classifier recommendation:

    Anime name  
86 Shingeki no Kyojin

Time to calculate it : 40.65 seconds

Processing data...

Bagging classifier using k-nearest neighbors vote recommendation:

    Anime name  
86 Shingeki no Kyojin

Time to calculate it : 8.24 seconds

Processing data...

Bagging classifier using Decision Tree Classifier recommendation:

Warning : the maximum depth of the tree is limited to 10 in this particular test

    Anime name  
2167 Tactics

Time to calculate it : 5.15 seconds