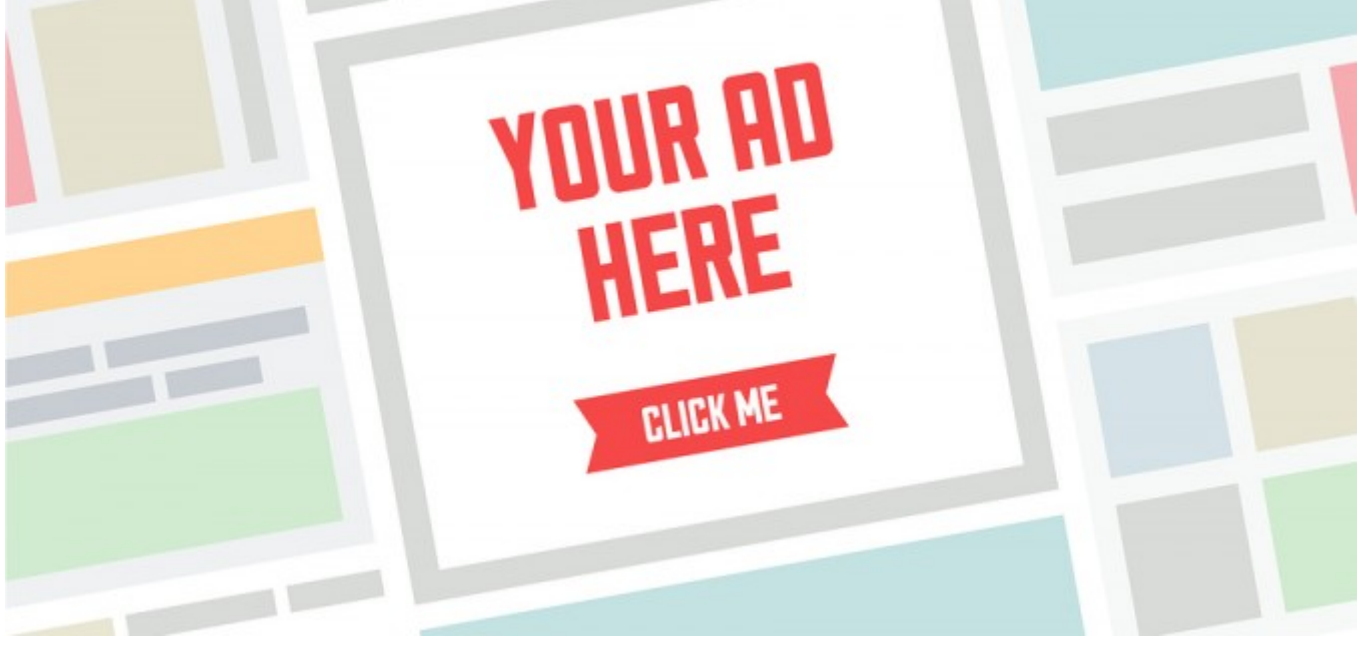
Advertising recommendation system

Usually, a recommendation system is used by corporations in order to suggest something to their users. This "something" is usually valuable in money so suggesting an item that could be interesting for the user is positive both for the company and for the user.

Why ”advertising”?

Advertising the right customers about a product could make the difference. The idea behind this project is to give to the company a suggestion on which users, who are really interested in the product, to advertise. Doing this, we will avoid to spam ads which are not interesting for the user.



Building a recommendation system

We are going to try to build this kind of recommendation system with only a small amount of data crawled from reddit. In particular, we are going to get some data from r/movies.

What do we need to build a recommendation system?

The main answer is **DATA!**

In particular, we need data about users. Indeed, in order to build a recommendation system, we need people's opinions about items. So, in our case, what we need to do is to look for discussions in which users are asked to say something about a film.

Take a look at our data

After we've collected our data using PRAW API, let's give it a look.

In [4]:
```
#visualize some rows of the dataframe
```

Out[4]:

	Title	Comment	User
0	What do you think about the movie The Princess...	It never fails to bring laughs, no matter how ...	vicky436
1	What do you think about the movie The Princess...	It's not a good movie, it's the best movie eve...	jakethesnake741
2	What do you think about the movie The Princess...	If your friend doesn't love this movie he does...	jrobertson50
3	What do you think about the movie The Princess...	Not liking the movie is inconceivable!	Antelino
4	What do you think about the movie The Princess...	#Anybody want a peanut?	UHeardAboutPluto
...	...	...	...
496	What do you think about Del Toro's CRONOS ?	Great story and acting, and very moody	DrScientist812
497	What do you think about Matt Reeves remake, Le...	It might be alright. I haven't seen it yet. It...	None
498	What do you think about Matt Reeves remake, Le...	I'm *trying* not to think of it. It makes me m...	None
499	So what do you think about Nolan directing a b...	I'll allow it.*\n\n*as long as Bale/DiCaprio/J...	SithLard
500	So what do you think about Nolan directing a b...	I think it would have an epic soundtrack.	MFchimichanga

501 rows × 3 columns

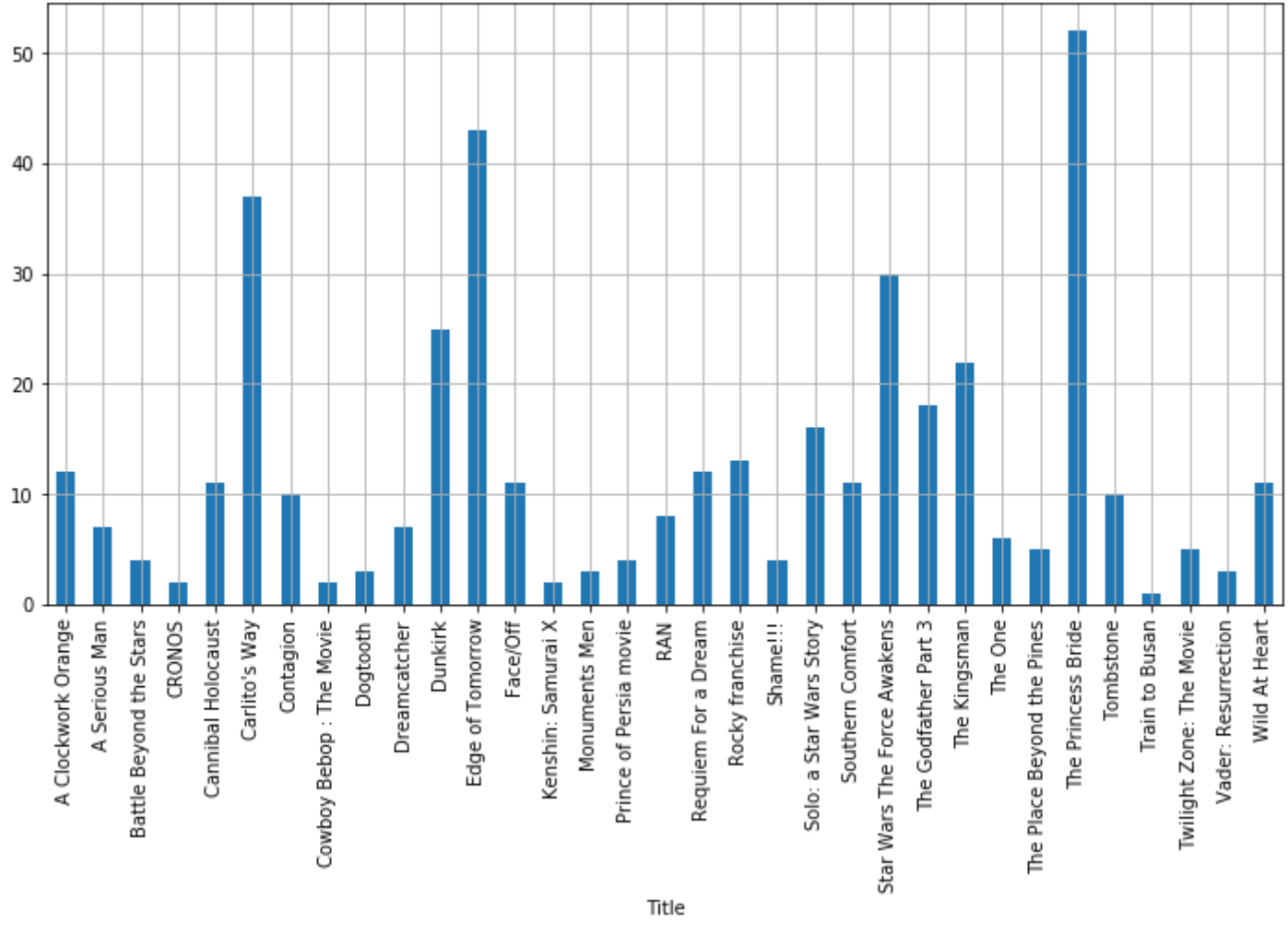
In [1]:
```
#get some info about dataframe
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 455 entries, 0 to 454
Data columns (total 3 columns):
Title      455 non-null object
Comment    455 non-null object
User       455 non-null object
dtypes: object(3)
memory usage: 10.8+ KB
```

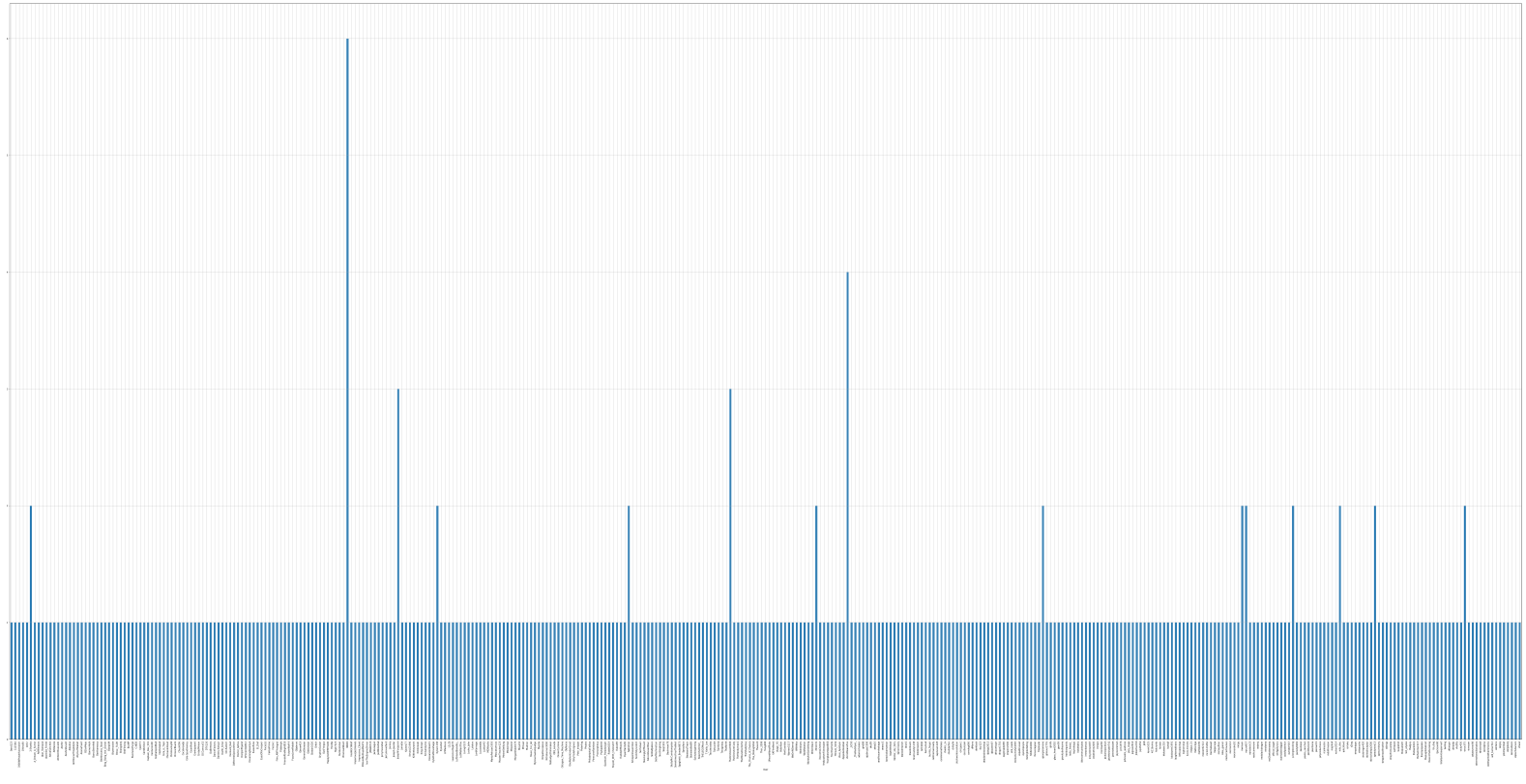
Out[1]:

	Title	Comment	User
count	455	455	455
unique	34	452	388
top	The Princess Bride	[deleted]	None
freq	56	3	45

In [5]:
```
#plot the number of users per each discussion
```



In [4]:
```
#plot the number of comments per user
```



Transform the comments in a rating

Since we have just text comments, we need a way to transform those in a number which can express the user's opinion about that item.

Convert comments into ratings using Sentiment Analysis

After we have collected our data from reddit, we can start to analyze the comments in order to get the relative sentiment. In order to do this, we are going to use VADER.

In [1]:
```
import pandas as pd
import nltk

nltk.download('vader_lexicon')

data_set = pd.read_csv('data_set.csv')
data_set.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 455 entries, 0 to 454
Data columns (total 3 columns):
Title      455 non-null object
Comment    455 non-null object
User       455 non-null object
dtypes: object(3)
memory usage: 10.8+ KB
```

VADER

We are now going to apply VADER's algorithm to each of our comments in the dataset, taking just the compound score which is a normalized sum of all the other scores (pos, neu, neg).

In [2]:
```
from nltk.sentiment.vader import SentimentIntensityAnalyzer

sid = SentimentIntensityAnalyzer()

#creating a lambda function which computes the scores for x and getting only the compound
sentiment = lambda x: sid.polarity_scores(x)['compound']
sentiment(data_set.loc[0]['Comment'])
```

Out[2]:
```
0.5994
```

In [3]:
```
from tqdm import tqdm
tqdm.pandas()

#applying that function to our dataset
data_set['Sentiment'] = data_set['Comment'].progress_apply(sentiment)
data_set.head()

data_set.to_csv('Sentiment.csv', index=False)
```

```
/home/default/anaconda3/lib/python3.7/site-packages/tqdm/std.py:648: FutureWar
ning: The Panel class is removed from pandas. Accessing it from the top-level
namespace will also be removed in the next version
  from pandas import Panel
100%|██████████| 455/455 [00:00<00:00, 1621.74it/s]
```

Out[3]:

	Title	Comment	User	Sentiment
0	A Clockwork Orange	Loved the book, movie was mediocre	19lins90	0.5994
1	A Clockwork Orange	My buddy told me it was one of his all time fa...	Anefor	0.6369
2	A Clockwork Orange	I think it's hard to put the extreme emotions ...	cheddarfire	-0.4310
3	A Clockwork Orange	I haven't seen it but I'm tempted to watch it....	DanceFactory	-0.5965
4	A Clockwork Orange	I saw it once, and really enjoyed it but I've ...	High7323	0.1770

Let's now build our recommendation system

First of all, let's load our new dataset created before

In [1]:
```
import pandas as pd
import numpy as np

data = pd.read_csv('Sentiment.csv')
data = data[data.User != "None"].reset_index(drop=True)
data = data.drop([329, 197, 112]).reset_index(drop=True).sort_values(by=['User'
]) #drop users who have commented the same post more than once
data.head()
```

Out[1]:

	Title	Comment	User	Sentiment
119	Edge of Tomorrow	Fantastic movie, I watched it for Emily Blunt ...	0and123	0.9201
177	Monuments Men	It looks very good, but I am concerned about t...	111584	-0.3514
162	Face/Off	I think you need to take it for what it is, it...	1900WPowerfulcleaner	0.8898
0	A Clockwork Orange	Loved the book, movie was mediocre	19lins90	0.5994
326	The Princess Bride	I broke up with a girl over this movie, after ...	1Q72	0.1154

Transform titles and users into ids

In [2]:
```
#get user unique ids
users = data['User'].unique()
print(len(users))
users_id = {}

for i in range(0, len(users)):
    users_id.update({i:users[i]})

#assignign each comment author his id

u_id = []
for u in data['User']:
    for i in range(0,len(users_id)):
        if u == users_id[i]:
            u_id.append(i)

data['User_id'] = u_id
```

```
387
```

In [3]:

```
#get title unique ids

titles = data['Title'].unique() #makes an array of titles
titles_id = {}

for i in range(0, len(titles)):
    titles_id.update({i:titles[i]})

titles_id[0]

#assignign each comment author his id

t_id = []
for t in data['Title']:
    for i in range(0,len(titles_id)):
        if t == titles_id[i]:
            t_id.append(i)


data['Title_id'] = t_id
data
```

Out[3]:

	Title	Comment	User	Sentiment	User_id	Title_id
119	Edge of Tomorrow	Fantastic movie, I watched it for Emily Blunt ...	0and123	0.9201	0	0
177	Monuments Men	It looks very good, but I am concerned about t...	111584	-0.3514	1	1
162	Face/Off	I think you need to take it for what it is, it...	1900WPowerfulcleaner	0.8898	2	2
0	A Clockwork Orange	Loved the book, movie was mediocre	19lins90	0.5994	3	3
326	The Princess Bride	I broke up with a girl over this movie, after ...	1Q72	0.1154	4	4
...	...	...	...	...	...	...
292	The Godfather Part 3	> Robert Duvall was also sorely missed as Tom ...	yokelwombat	-0.2960	382	7
80	Contagion	Terrifying and realistic. I assembled a small ...	zargalarg	-0.7430	383	16
395	Vader: Resurrection	I think it's a bad idea. That being said, I a...	zeronullzero	-0.6459	384	8
70	Carlito's Way	Benny from the Bronx!!	ziplocfullacock	0.0000	385	5
233	Solo: a Star Wars Story	but Solo isn't an origin story	zmeul	0.0000	386	14

407 rows × 6 columns

Getting items profile

In order to get the item profiles we are going to create a BOW representation of all the comments, applying TF-IDF and represent each item with its representation vector.

In [4]:
```
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.feature_extraction.text import TfidfTransformer

count_vec = CountVectorizer()
comment_count = count_vec.fit_transform(data['Comment']) # Creating a BOW for al
l the comments


tfidf = TfidfTransformer(smooth_idf=True, use_idf=True)
tfidf.fit(comment_count) # Applying TF-IDF to our BOW model

item_profiles = [] # Array where profiles will be stored

for t in titles:
    data1 = data[data['Title'] == t]
    comments = [' '.join(data1['Comment'])]# Joins all the comments for that tit
le, creating a document
    item_profiles.append(tfidf.transform(count_vec.transform(comments))) # Appen
d the BOW representation for that title

print(item_profiles[0].toarray())
print(len(count_vec.vocabulary_))
item_profiles[0].shape
```

```
[[0. 0. 0. ... 0. 0. 0.]]
3096
```

Out[4]: (1, 3096)

Calculating users profile

Since we have got so few data about users (as we can see before in the plots,the majority of the users have just expressed one opinion for one item), we are not able to use a collaborative filtering approach. Instead, we are going to use a content-based filtering approach.

We are going to calculate the user profile as the sum of each item he has "rated" multiplied by the relative sentiment.
For example: the user **A** has rated these items **{1,2,3}**. The user profile is calculated as:

(profile(1) * sentiment(1)) + (profile(2) * sentiment(2)) + (profile(3) * sentiment(3))
Then, to have a normalized result, we are going to divide by the number of items he has rated.

Code

In [5]:
```
# Calculate user profiles as follow:
# Sum all the item profiles for the films he gave a rating and multiply each of
 that for the corresponding sentiment

user_profile = []

# Getting the number of 'ratings' of users
rating_count = data.groupby(['User_id'], as_index=True).size().tolist()

for i in range (0,len(users)):
    user_profile.append(0)

# We are using this indexing so that we take the user's id from the df and inser
t in his corresponing item
for index, row in data.iterrows():
    user_profile[row['User_id']] += (item_profiles[row['Title_id']] * row['Senti
ment'])

# Normalize dividing by rating_count
for i in range(0, len(users)):
    user_profile[i] = user_profile[i] / rating_count[i]


print(user_profile[0].shape)
print(user_profile[26].toarray())
```

```
(1, 3096)
[[0. 0. 0. ... 0. 0. 0.]]
```

System's predictions

We are going to estimate the likelihood of a user appreciating an item he doesn't know just calculating the cosine similarity between the user profile and the item profile. This will give us a number cromprised between -1 and 1, just as the sentiment value. Example:

In [6]:
```
#we are going to use the cosine function given by scipy library
from scipy import spatial

cd = 1 - spatial.distance.cosine(user_profile[0].toarray(), item_profiles[4].toa
rray())
cd
```

Out[6]:
```
0.5655293825994097
```

Take a look at our utility matrix

In [7]:
```
#creating our utility matrix
um = data.pivot_table(index='User_id', columns='Title_id', values='Sentiment')
um.head()
```

Out[7]:

Title_id	0	1	2	3	4	5	6	7	8	9	...	23	24	25	26	27	28	29	30
User_id																			
0	0.9201	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	NaN	-0.3514	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2	NaN	NaN	0.8898	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	NaN	NaN	NaN	0.5994	NaN	NaN	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4	NaN	NaN	NaN	NaN	0.1154	NaN	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

5 rows × 33 columns

Let's fill our utility matrix!

In [9]:
```
#cosine similarity function
def distance(user, item):
        distance = 1 - spatial.distance.cosine(user_profile[user].toarray(), ite
m_profiles[item].toarray())
        return distance
```

In [10]:
```
import math

# If the cell is NaN assign the cosine similarity between the user and the item
for i in range(0, len(um)):
    for j in range(0, len(titles)):
        if(math.isnan(um.loc[i].loc[j])):
            um.loc[i].loc[j] = distance(i, j)
um.head()
```

```
/home/guberlo/anaconda3/lib/python3.7/site-packages/scipy/spatial/distance.py:
720: RuntimeWarning: invalid value encountered in double_scalars
  dist = 1.0 - uv / np.sqrt(uu * vv)
```

Out[10]:

Title_id	0	1	2	3	4	5	6	7	8	9	...	
User_id												
0	0.920100	0.264297	0.405923	0.530165	0.565529	0.539595	0.633302	0.560444	0.263590	0.255004	...	0.47
1	-0.264297	-0.351400	-0.165739	-0.246815	-0.243521	-0.212430	-0.279310	-0.254312	-0.131595	-0.087097	...	-0.2
2	0.405923	0.165739	0.889800	0.367737	0.363838	0.338167	0.433341	0.359843	0.188811	0.136026	...	0.29
3	0.530165	0.246815	0.367737	0.599400	0.527194	0.472289	0.553433	0.507134	0.267033	0.199985	...	0.44
4	0.565529	0.243521	0.363838	0.527194	0.115400	0.539595	0.620647	0.559877	0.249857	0.206270	...	0.47

5 rows × 33 columns

Test if our algorithm is working or not

We have created our recommendation system but... will it work? In order to test it, we have to compare the predicted ratings with the known ratings for the users who gave more than one opinions. Let's take a look at those users:

In [11]:
```
# Some data about users who wrote more than one comment
d_u = data['User']
duplicated = data[d_u.isin(d_u[d_u.duplicated()])].sort_values("User")

duplicated.head()
```

Out[11]:

	Title	Comment	User	Sentiment	User_id	Title_id
138	Edge of Tomorrow	It was great until Cruise and Blunt got to the...	IWW4	0.6249	86	0
222	Solo: a Star Wars Story	I have always found origin stories to be a was...	IWW4	-0.6486	86	14
26	Cannibal Holocaust	> Cannibal Holocaust\n\n\nI really try not to.	IWW4	0.0000	86	23
400	Wild At Heart	I don't really like it all.	IWW4	-0.3241	86	20
100	Dunkirk	I liked it less and less the more times I saw it.	IWW4	0.4215	86	24

In [12]:
```
# Getting the id for users who wrote more than one comment
d_users = duplicated['User_id'].unique()
d_users
```

Out[12]:
```
array([ 86,  99, 109, 158, 184, 206, 214, 264, 315, 328, 340, 372])
```

How to test?

Since we have so few data, we are going to use the Leave-one-out method in order to test.
We are going to calculate each score known, one at a time, for the users who reviewed more than one item.

This is what we are going to do:

- Take a user
- Set one of his ratings to NaN
- Calculate his user profile
- Predict the ratings using cosine similarity
- Compare the predicted value with the ground truth value stored in the dataframe

This pipeline will be applied for each user who wrote more than one comment and for each item he gave an opinion

Code

In [13]:
```
#in order to set each time only one value to null, we save user id as index and
 titles id for which he wrote a comment
#as values so that we can choose which one to give null value

dic = {}
arr = []

for u in d_users:
    arr = []
    for i, row in duplicated[duplicated['User_id'] == u].iterrows():
        arr.append(row['Title_id'])
        dic.update({u:arr})

dic
```

Out[13]:
```
{86: [0, 14, 23, 20, 24, 17],
 99: [28, 25, 19],
 109: [14, 24],
 158: [17, 0],
 184: [24, 23, 4],
 206: [5, 24],
 214: [17, 31, 28, 18],
 264: [2, 22],
 315: [20, 25],
 328: [10, 28],
 340: [24, 4],
 372: [18, 21]}
```

Filling the desidered cells

In [14]:
```
true_values = []
predicted_values = []


for i in dic: #get user id from duplicated users
    for j in dic[i]: #get one of the item_id
        user_profile[i] = 0 #reset the user's profile each time we set a new val
ue to NaN
        t_v = umt.iloc[i][j]
        true_values.append(t_v) #store the truth value before deleting it
        umt.iloc[i][j] = float('NaN')
        count = 0
        for l in titles_id:
            if(not math.isnan(umt.iloc[i][l])): #building new user profile not c
onsidering the new nan
                user_profile[i] += (item_profiles[l] * umt.iloc[i][l])
                count = count + 1
        user_profile[i] = user_profile[i] / count

        #print('User: {}, Item: {}'.format(i, j)) #debugging to see if we are ca
lculating the right distances

        predicted_values.append(distance(i, j)) #store the predicted value which
we have set before the value to nan
        umt.iloc[i][j] = t_v #restore the original value
```

Compare the values

In [17]:
```
for i in range(0, len(true_values)):
    print("Predicted score: {:.3f} ----- True score: {:.3f}".format(predicted_v
alues[i], true_values[i]))
```

```
Predicted score: -0.356 ----- True score: 0.625
Predicted score: 0.368 ----- True score: -0.649
Predicted score: 0.098 ----- True score: 0.000
Predicted score: 0.197 ----- True score: -0.324
Predicted score: -0.280 ----- True score: 0.421
Predicted score: 0.151 ----- True score: -0.340
Predicted score: -0.338 ----- True score: 0.713
Predicted score: 0.230 ----- True score: -0.202
Predicted score: 0.174 ----- True score: -0.235
Predicted score: -0.527 ----- True score: 0.153
Predicted score: 0.527 ----- True score: -0.649
Predicted score: 0.371 ----- True score: 0.586
Predicted score: 0.371 ----- True score: 0.840
Predicted score: 0.518 ----- True score: 0.892
Predicted score: 0.518 ----- True score: 0.815
Predicted score: 0.640 ----- True score: 0.000
Predicted score: 0.587 ----- True score: 0.206
Predicted score: 0.587 ----- True score: 0.782
Predicted score: 0.352 ----- True score: -0.802
Predicted score: 0.122 ----- True score: 0.874
Predicted score: 0.169 ----- True score: 0.493
Predicted score: 0.086 ----- True score: 0.927
Predicted score: 0.284 ----- True score: 0.964
Predicted score: 0.284 ----- True score: 0.735
Predicted score: 0.315 ----- True score: 0.948
Predicted score: 0.315 ----- True score: 0.889
Predicted score: 0.237 ----- True score: 0.939
Predicted score: 0.237 ----- True score: 0.526
Predicted score: -0.637 ----- True score: -0.714
Predicted score: -0.637 ----- True score: -0.547
Predicted score: -0.297 ----- True score: 0.625
Predicted score: 0.297 ----- True score: -0.477
```

MAE

Let's now calculate the Mean Absolute Error between our predictions and the truth value

In [18]:
```
#measure performance with mae
def mae(y_true, y_pred):
    return (y_true-y_pred).abs().mean()

mae(pd.Series(true_values), pd.Series(predicted_values))
```

Out[18]:
```
0.5747905734199232
```

Plot to have a better understanding

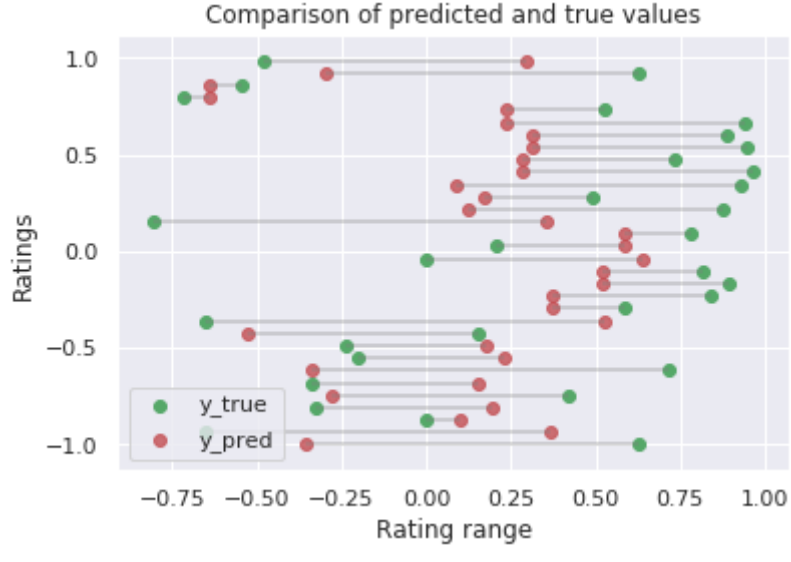
In [19]:
```
import matplotlib.pyplot as plt

rating_range = np.arange(-1, 1, 0.064)

plt.hlines(y=rating_range, xmin=validation['y_true'], xmax=validation['y_pred'],
color='grey', alpha=0.4)
plt.scatter(validation['y_true'], rating_range, color='g', alpha=1, label='y_tru
e')
plt.scatter(validation['y_pred'], rating_range, color='r', alpha=0.8 , label='y_
pred')
plt.legend(loc='lower left')

# Add title and axis names
plt.title("Comparison of predicted and true values", loc='center')
plt.xlabel('Rating range')
plt.ylabel('Ratings')
```

Out[19]:
```
Text(0, 0.5, 'Ratings')
```



Does it work?

Actually, this is not the best result we'd like to get. The MAE score is too high to have a good reliability. What we can do now is checking whether our algorithm is better than calculating the ratings randomly or not.

So instead of calculating the rating as the cosine similarity between user and item profile, we are going to calculate it as a random number between -1 and 1

In [8]:
```
# Random number between -1 and 1
import random

def predict():
        y_pred = 1 - (random.uniform(0,1) * 2)
        return y_pred
```

Filling the values

Since this is a random algorithm, in order to have a stronger reliability we will test 40 different times.

In [9]:
```
true_values = []
predicted_values = []

for i in range(0,40): #this is done in order to have a stronger reliability sinc
e the algorithm is random
    true_values.append([])#we will have 40 different values to test
    predicted_values.append([])


for p in range(0,len(true_values)):
    for i in dic: #get user id from duplicated users
        for j in dic[i]: #get one of the item_id
            t_v = umt.iloc[i][j]
            true_values[p].append(t_v) #store the truth value before deleting it
            umt.iloc[i][j] = float('NaN')
            #print('User: {}, Item: {}'.format(i, j)) #debugging to see if we ar
e calculating the right distances

            predicted_values[p].append(predict()) #store the predicted value whi
ch we have set before the value to nan
            umt.iloc[i][j] = t_v #restore the original value
```

Compare the values

In [11]:
```
for i in range(0, len(true_values)):
    for j in range(0,len(true_values[i])):
        print("Predicted score: {:.3f} ----- True score: {:.3f}".format(predicte
d_values[i][j], true_values[i][j]))
    print('\n#######################################\n')
```

```
Predicted score: 0.770 ----- True score: 0.625
Predicted score: 0.523 ----- True score: -0.649
Predicted score: -0.100 ----- True score: 0.000
Predicted score: -0.756 ----- True score: -0.324
Predicted score: -0.793 ----- True score: 0.421
Predicted score: 0.444 ----- True score: -0.340
Predicted score: 0.246 ----- True score: 0.713
Predicted score: -0.250 ----- True score: -0.202
Predicted score: 0.921 ----- True score: -0.235
Predicted score: 0.114 ----- True score: 0.153
Predicted score: 0.783 ----- True score: -0.649
Predicted score: -0.627 ----- True score: 0.586
Predicted score: 0.372 ----- True score: 0.840
Predicted score: -0.017 ----- True score: 0.892
Predicted score: 0.439 ----- True score: 0.815
Predicted score: -0.873 ----- True score: 0.000
Predicted score: -0.212 ----- True score: 0.206
Predicted score: -0.101 ----- True score: 0.782
Predicted score: -0.653 ----- True score: -0.802
Predicted score: -0.207 ----- True score: 0.874
Predicted score: -0.034 ----- True score: 0.493
Predicted score: -0.226 ----- True score: 0.927
Predicted score: 0.442 ----- True score: 0.964
Predicted score: 0.347 ----- True score: 0.735
Predicted score: -0.221 ----- True score: 0.948
Predicted score: 0.341 ----- True score: 0.889
Predicted score: -0.654 ----- True score: 0.939
Predicted score: -0.879 ----- True score: 0.526
Predicted score: 0.417 ----- True score: -0.714
Predicted score: 0.408 ----- True score: -0.547
Predicted score: -0.306 ----- True score: 0.625
```

```
Predicted score: 0.255 ----- True score: -0.477

#######################################

Predicted score: -0.360 ----- True score: 0.625
Predicted score: -0.448 ----- True score: -0.649
Predicted score: 0.569 ----- True score: 0.000
Predicted score: -0.862 ----- True score: -0.324
Predicted score: -0.041 ----- True score: 0.421
Predicted score: -0.072 ----- True score: -0.340
Predicted score: -0.652 ----- True score: 0.713
Predicted score: 0.173 ----- True score: -0.202
Predicted score: 0.595 ----- True score: -0.235
Predicted score: 0.460 ----- True score: 0.153
Predicted score: -0.699 ----- True score: -0.649
Predicted score: -0.721 ----- True score: 0.586
Predicted score: -0.818 ----- True score: 0.840
Predicted score: -0.596 ----- True score: 0.892
Predicted score: -0.099 ----- True score: 0.815
Predicted score: -0.630 ----- True score: 0.000
Predicted score: 0.581 ----- True score: 0.206
Predicted score: 0.409 ----- True score: 0.782
Predicted score: -0.170 ----- True score: -0.802
Predicted score: 0.138 ----- True score: 0.874
Predicted score: -0.588 ----- True score: 0.493
Predicted score: -0.580 ----- True score: 0.927
Predicted score: -0.409 ----- True score: 0.964
Predicted score: -0.687 ----- True score: 0.735
Predicted score: 0.059 ----- True score: 0.948
Predicted score: -0.566 ----- True score: 0.889
Predicted score: -0.474 ----- True score: 0.939
Predicted score: 0.484 ----- True score: 0.526
Predicted score: 0.820 ----- True score: -0.714
Predicted score: -0.397 ----- True score: -0.547
Predicted score: 0.772 ----- True score: 0.625
Predicted score: -0.105 ----- True score: -0.477

#######################################
```

```
Predicted score: 0.314 ----- True score: 0.625
Predicted score: -0.177 ----- True score: -0.649
Predicted score: -0.876 ----- True score: 0.000
Predicted score: 0.586 ----- True score: -0.324
Predicted score: -0.681 ----- True score: 0.421
Predicted score: -0.964 ----- True score: -0.340
Predicted score: 0.517 ----- True score: 0.713
Predicted score: -0.976 ----- True score: -0.202
Predicted score: 0.690 ----- True score: -0.235
Predicted score: 0.725 ----- True score: 0.153
Predicted score: -0.643 ----- True score: -0.649
Predicted score: 0.025 ----- True score: 0.586
Predicted score: -0.531 ----- True score: 0.840
Predicted score: -0.155 ----- True score: 0.892
Predicted score: -0.747 ----- True score: 0.815
Predicted score: 0.654 ----- True score: 0.000
Predicted score: -0.962 ----- True score: 0.206
Predicted score: -0.184 ----- True score: 0.782
Predicted score: 0.804 ----- True score: -0.802
Predicted score: 0.336 ----- True score: 0.874
Predicted score: 0.729 ----- True score: 0.493
Predicted score: -0.971 ----- True score: 0.927
Predicted score: 0.548 ----- True score: 0.964
Predicted score: 0.091 ----- True score: 0.735
Predicted score: 0.251 ----- True score: 0.948
Predicted score: -0.018 ----- True score: 0.889
Predicted score: 0.176 ----- True score: 0.939
Predicted score: -0.726 ----- True score: 0.526
Predicted score: 0.173 ----- True score: -0.714
Predicted score: -0.139 ----- True score: -0.547
Predicted score: 0.536 ----- True score: 0.625
Predicted score: -0.369 ----- True score: -0.477

########################################

Predicted score: -0.205 ----- True score: 0.625
Predicted score: 0.092 ----- True score: -0.649
```

```
Predicted score: 0.001 ----- True score: 0.000
Predicted score: 0.836 ----- True score: -0.324
Predicted score: 0.454 ----- True score: 0.421
Predicted score: -0.552 ----- True score: -0.340
Predicted score: -0.599 ----- True score: 0.713
Predicted score: 0.295 ----- True score: -0.202
Predicted score: -0.410 ----- True score: -0.235
Predicted score: 0.950 ----- True score: 0.153
Predicted score: 0.672 ----- True score: -0.649
Predicted score: 0.678 ----- True score: 0.586
Predicted score: -0.741 ----- True score: 0.840
Predicted score: 0.533 ----- True score: 0.892
Predicted score: 0.284 ----- True score: 0.815
Predicted score: 0.933 ----- True score: 0.000
Predicted score: 0.243 ----- True score: 0.206
Predicted score: -0.068 ----- True score: 0.782
Predicted score: -0.168 ----- True score: -0.802
Predicted score: 0.321 ----- True score: 0.874
Predicted score: -0.997 ----- True score: 0.493
Predicted score: -0.895 ----- True score: 0.927
Predicted score: -0.832 ----- True score: 0.964
Predicted score: 0.872 ----- True score: 0.735
Predicted score: -0.084 ----- True score: 0.948
Predicted score: 0.201 ----- True score: 0.889
Predicted score: -0.167 ----- True score: 0.939
Predicted score: 0.811 ----- True score: 0.526
Predicted score: -0.454 ----- True score: -0.714
Predicted score: 0.269 ----- True score: -0.547
Predicted score: 0.341 ----- True score: 0.625
Predicted score: 0.472 ----- True score: -0.477

########################################

Predicted score: -0.646 ----- True score: 0.625
Predicted score: 0.205 ----- True score: -0.649
Predicted score: -0.808 ----- True score: 0.000
Predicted score: 0.563 ----- True score: -0.324
Predicted score: 0.343 ----- True score: 0.421
```

```
Predicted score: 0.308 ----- True score: -0.340
Predicted score: 0.749 ----- True score: 0.713
Predicted score: 0.076 ----- True score: -0.202
Predicted score: 0.793 ----- True score: -0.235
Predicted score: -0.865 ----- True score: 0.153
Predicted score: -0.194 ----- True score: -0.649
Predicted score: 0.779 ----- True score: 0.586
Predicted score: 0.161 ----- True score: 0.840
Predicted score: 0.387 ----- True score: 0.892
Predicted score: -0.400 ----- True score: 0.815
Predicted score: -0.452 ----- True score: 0.000
Predicted score: 0.530 ----- True score: 0.206
Predicted score: 0.138 ----- True score: 0.782
Predicted score: 0.905 ----- True score: -0.802
Predicted score: 0.940 ----- True score: 0.874
Predicted score: -0.090 ----- True score: 0.493
Predicted score: 0.972 ----- True score: 0.927
Predicted score: 0.117 ----- True score: 0.964
Predicted score: 0.406 ----- True score: 0.735
Predicted score: -0.624 ----- True score: 0.948
Predicted score: -0.671 ----- True score: 0.889
Predicted score: 0.087 ----- True score: 0.939
Predicted score: -0.569 ----- True score: 0.526
Predicted score: 0.228 ----- True score: -0.714
Predicted score: -0.426 ----- True score: -0.547
Predicted score: 0.169 ----- True score: 0.625
Predicted score: -0.748 ----- True score: -0.477

########################################

Predicted score: 0.889 ----- True score: 0.625
Predicted score: -0.513 ----- True score: -0.649
Predicted score: 0.706 ----- True score: 0.000
Predicted score: 0.199 ----- True score: -0.324
Predicted score: 0.525 ----- True score: 0.421
Predicted score: 0.528 ----- True score: -0.340
Predicted score: -0.058 ----- True score: 0.713
Predicted score: 0.511 ----- True score: -0.202
```

```
Predicted score: -0.432 ----- True score: -0.235
Predicted score: -0.332 ----- True score: 0.153
Predicted score: 0.837 ----- True score: -0.649
Predicted score: -0.268 ----- True score: 0.586
Predicted score: 0.894 ----- True score: 0.840
Predicted score: -0.598 ----- True score: 0.892
Predicted score: -0.129 ----- True score: 0.815
Predicted score: 0.642 ----- True score: 0.000
Predicted score: 0.928 ----- True score: 0.206
Predicted score: -0.716 ----- True score: 0.782
Predicted score: 0.048 ----- True score: -0.802
Predicted score: -0.104 ----- True score: 0.874
Predicted score: -0.467 ----- True score: 0.493
Predicted score: -0.164 ----- True score: 0.927
Predicted score: 0.045 ----- True score: 0.964
Predicted score: -0.677 ----- True score: 0.735
Predicted score: 0.420 ----- True score: 0.948
Predicted score: -0.923 ----- True score: 0.889
Predicted score: -0.288 ----- True score: 0.939
Predicted score: -0.363 ----- True score: 0.526
Predicted score: -0.490 ----- True score: -0.714
Predicted score: -0.386 ----- True score: -0.547
Predicted score: 0.048 ----- True score: 0.625
Predicted score: -0.864 ----- True score: -0.477

########################################

Predicted score: -0.559 ----- True score: 0.625
Predicted score: -0.609 ----- True score: -0.649
Predicted score: 0.293 ----- True score: 0.000
Predicted score: 0.231 ----- True score: -0.324
Predicted score: -0.149 ----- True score: 0.421
Predicted score: 0.316 ----- True score: -0.340
Predicted score: -0.479 ----- True score: 0.713
Predicted score: 0.408 ----- True score: -0.202
Predicted score: -0.501 ----- True score: -0.235
Predicted score: -0.799 ----- True score: 0.153
Predicted score: 0.150 ----- True score: -0.649
```

```
Predicted score: 0.203 ----- True score: 0.586
Predicted score: 0.735 ----- True score: 0.840
Predicted score: -0.960 ----- True score: 0.892
Predicted score: -0.644 ----- True score: 0.815
Predicted score: -0.233 ----- True score: 0.000
Predicted score: -0.232 ----- True score: 0.206
Predicted score: 0.893 ----- True score: 0.782
Predicted score: -0.753 ----- True score: -0.802
Predicted score: 0.360 ----- True score: 0.874
Predicted score: 0.620 ----- True score: 0.493
Predicted score: 0.200 ----- True score: 0.927
Predicted score: -0.833 ----- True score: 0.964
Predicted score: 0.885 ----- True score: 0.735
Predicted score: -0.170 ----- True score: 0.948
Predicted score: -0.848 ----- True score: 0.889
Predicted score: -0.347 ----- True score: 0.939
Predicted score: -0.921 ----- True score: 0.526
Predicted score: -0.213 ----- True score: -0.714
Predicted score: -0.314 ----- True score: -0.547
Predicted score: 0.506 ----- True score: 0.625
Predicted score: 0.849 ----- True score: -0.477

########################################

Predicted score: 0.793 ----- True score: 0.625
Predicted score: -0.113 ----- True score: -0.649
Predicted score: 0.065 ----- True score: 0.000
Predicted score: 0.802 ----- True score: -0.324
Predicted score: 0.323 ----- True score: 0.421
Predicted score: 0.052 ----- True score: -0.340
Predicted score: -0.019 ----- True score: 0.713
Predicted score: -0.254 ----- True score: -0.202
Predicted score: 0.984 ----- True score: -0.235
Predicted score: 0.315 ----- True score: 0.153
Predicted score: 0.202 ----- True score: -0.649
Predicted score: 0.726 ----- True score: 0.586
Predicted score: -0.608 ----- True score: 0.840
Predicted score: -0.409 ----- True score: 0.892
```

```
Predicted score: -0.109 ----- True score: 0.815
Predicted score: -0.876 ----- True score: 0.000
Predicted score: 0.237 ----- True score: 0.206
Predicted score: 0.089 ----- True score: 0.782
Predicted score: 0.233 ----- True score: -0.802
Predicted score: 0.138 ----- True score: 0.874
Predicted score: 0.594 ----- True score: 0.493
Predicted score: -0.693 ----- True score: 0.927
Predicted score: 0.682 ----- True score: 0.964
Predicted score: -0.321 ----- True score: 0.735
Predicted score: -0.350 ----- True score: 0.948
Predicted score: -0.939 ----- True score: 0.889
Predicted score: -0.316 ----- True score: 0.939
Predicted score: -0.571 ----- True score: 0.526
Predicted score: 0.627 ----- True score: -0.714
Predicted score: -0.432 ----- True score: -0.547
Predicted score: 0.472 ----- True score: 0.625
Predicted score: 0.361 ----- True score: -0.477

########################################

Predicted score: 0.491 ----- True score: 0.625
Predicted score: 0.870 ----- True score: -0.649
Predicted score: 0.792 ----- True score: 0.000
Predicted score: 0.685 ----- True score: -0.324
Predicted score: -0.577 ----- True score: 0.421
Predicted score: 0.503 ----- True score: -0.340
Predicted score: -0.622 ----- True score: 0.713
Predicted score: -0.866 ----- True score: -0.202
Predicted score: -0.808 ----- True score: -0.235
Predicted score: 0.223 ----- True score: 0.153
Predicted score: 0.717 ----- True score: -0.649
Predicted score: -0.780 ----- True score: 0.586
Predicted score: -0.771 ----- True score: 0.840
Predicted score: 0.293 ----- True score: 0.892
Predicted score: 0.794 ----- True score: 0.815
Predicted score: -0.453 ----- True score: 0.000
Predicted score: -0.627 ----- True score: 0.206
```

```
Predicted score: -0.619 ----- True score: 0.782
Predicted score: 0.065 ----- True score: -0.802
Predicted score: -0.095 ----- True score: 0.874
Predicted score: 0.424 ----- True score: 0.493
Predicted score: -0.730 ----- True score: 0.927
Predicted score: -0.842 ----- True score: 0.964
Predicted score: -0.153 ----- True score: 0.735
Predicted score: 0.534 ----- True score: 0.948
Predicted score: 0.079 ----- True score: 0.889
Predicted score: 0.696 ----- True score: 0.939
Predicted score: 0.206 ----- True score: 0.526
Predicted score: -0.691 ----- True score: -0.714
Predicted score: 0.444 ----- True score: -0.547
Predicted score: -0.104 ----- True score: 0.625
Predicted score: 0.458 ----- True score: -0.477

########################################

Predicted score: -0.273 ----- True score: 0.625
Predicted score: -0.416 ----- True score: -0.649
Predicted score: 0.407 ----- True score: 0.000
Predicted score: -0.124 ----- True score: -0.324
Predicted score: -0.907 ----- True score: 0.421
Predicted score: 0.495 ----- True score: -0.340
Predicted score: 0.998 ----- True score: 0.713
Predicted score: 0.848 ----- True score: -0.202
Predicted score: 0.997 ----- True score: -0.235
Predicted score: 0.507 ----- True score: 0.153
Predicted score: 0.587 ----- True score: -0.649
Predicted score: -0.725 ----- True score: 0.586
Predicted score: 0.826 ----- True score: 0.840
Predicted score: 0.369 ----- True score: 0.892
Predicted score: -0.225 ----- True score: 0.815
Predicted score: -0.380 ----- True score: 0.000
Predicted score: -0.253 ----- True score: 0.206
Predicted score: 0.393 ----- True score: 0.782
Predicted score: 0.748 ----- True score: -0.802
Predicted score: -0.538 ----- True score: 0.874
```

Predicted score: -0.654 ----- True score: 0.493
Predicted score: -0.609 ----- True score: 0.927
Predicted score: -0.439 ----- True score: 0.964
Predicted score: 0.105 ----- True score: 0.735
Predicted score: -0.453 ----- True score: 0.948
Predicted score: -0.730 ----- True score: 0.889
Predicted score: -0.647 ----- True score: 0.939
Predicted score: -0.957 ----- True score: 0.526
Predicted score: 0.401 ----- True score: -0.714
Predicted score: 0.864 ----- True score: -0.547
Predicted score: -0.456 ----- True score: 0.625
Predicted score: 0.795 ----- True score: -0.477

##

Predicted score: -0.290 ----- True score: 0.625
Predicted score: 0.674 ----- True score: -0.649
Predicted score: 0.681 ----- True score: 0.000
Predicted score: 0.912 ----- True score: -0.324
Predicted score: 0.185 ----- True score: 0.421
Predicted score: 0.307 ----- True score: -0.340
Predicted score: 0.656 ----- True score: 0.713
Predicted score: 0.083 ----- True score: -0.202
Predicted score: -0.116 ----- True score: -0.235
Predicted score: 0.848 ----- True score: 0.153
Predicted score: -0.422 ----- True score: -0.649
Predicted score: 0.806 ----- True score: 0.586
Predicted score: 0.038 ----- True score: 0.840
Predicted score: 0.414 ----- True score: 0.892
Predicted score: -0.189 ----- True score: 0.815
Predicted score: 0.352 ----- True score: 0.000
Predicted score: 0.060 ----- True score: 0.206
Predicted score: 0.636 ----- True score: 0.782
Predicted score: 0.845 ----- True score: -0.802
Predicted score: -0.939 ----- True score: 0.874
Predicted score: 0.296 ----- True score: 0.493
Predicted score: -0.193 ----- True score: 0.927
Predicted score: -0.450 ----- True score: 0.964

```
Predicted score: 0.342 ----- True score: 0.735
Predicted score: 0.631 ----- True score: 0.948
Predicted score: -0.693 ----- True score: 0.889
Predicted score: -0.274 ----- True score: 0.939
Predicted score: -0.026 ----- True score: 0.526
Predicted score: 0.327 ----- True score: -0.714
Predicted score: -0.602 ----- True score: -0.547
Predicted score: -0.552 ----- True score: 0.625
Predicted score: 0.936 ----- True score: -0.477

#####################################

Predicted score: 0.414 ----- True score: 0.625
Predicted score: 0.913 ----- True score: -0.649
Predicted score: 0.840 ----- True score: 0.000
Predicted score: 0.222 ----- True score: -0.324
Predicted score: 0.191 ----- True score: 0.421
Predicted score: -0.999 ----- True score: -0.340
Predicted score: -0.454 ----- True score: 0.713
Predicted score: 0.778 ----- True score: -0.202
Predicted score: -0.727 ----- True score: -0.235
Predicted score: 0.891 ----- True score: 0.153
Predicted score: -0.184 ----- True score: -0.649
Predicted score: -0.145 ----- True score: 0.586
Predicted score: -0.379 ----- True score: 0.840
Predicted score: 0.337 ----- True score: 0.892
Predicted score: -0.463 ----- True score: 0.815
Predicted score: 0.429 ----- True score: 0.000
Predicted score: -0.821 ----- True score: 0.206
Predicted score: -0.658 ----- True score: 0.782
Predicted score: 0.732 ----- True score: -0.802
Predicted score: 0.062 ----- True score: 0.874
Predicted score: 0.958 ----- True score: 0.493
Predicted score: -0.388 ----- True score: 0.927
Predicted score: 0.816 ----- True score: 0.964
Predicted score: 0.222 ----- True score: 0.735
Predicted score: -0.382 ----- True score: 0.948
Predicted score: -0.478 ----- True score: 0.889
```

```
Predicted score: 0.483 ----- True score: 0.939
Predicted score: 0.837 ----- True score: 0.526
Predicted score: 0.461 ----- True score: -0.714
Predicted score: -0.878 ----- True score: -0.547
Predicted score: 0.344 ----- True score: 0.625
Predicted score: 0.809 ----- True score: -0.477

########################################

Predicted score: 0.652 ----- True score: 0.625
Predicted score: 0.387 ----- True score: -0.649
Predicted score: 0.985 ----- True score: 0.000
Predicted score: 0.452 ----- True score: -0.324
Predicted score: -0.881 ----- True score: 0.421
Predicted score: 0.879 ----- True score: -0.340
Predicted score: 0.696 ----- True score: 0.713
Predicted score: 0.063 ----- True score: -0.202
Predicted score: 0.369 ----- True score: -0.235
Predicted score: 0.168 ----- True score: 0.153
Predicted score: -0.609 ----- True score: -0.649
Predicted score: 0.559 ----- True score: 0.586
Predicted score: 0.989 ----- True score: 0.840
Predicted score: -0.969 ----- True score: 0.892
Predicted score: 0.084 ----- True score: 0.815
Predicted score: -0.577 ----- True score: 0.000
Predicted score: -0.216 ----- True score: 0.206
Predicted score: 0.448 ----- True score: 0.782
Predicted score: 0.792 ----- True score: -0.802
Predicted score: 0.083 ----- True score: 0.874
Predicted score: 0.752 ----- True score: 0.493
Predicted score: -0.976 ----- True score: 0.927
Predicted score: 0.764 ----- True score: 0.964
Predicted score: -0.702 ----- True score: 0.735
Predicted score: -0.306 ----- True score: 0.948
Predicted score: -0.279 ----- True score: 0.889
Predicted score: -0.011 ----- True score: 0.939
Predicted score: -0.441 ----- True score: 0.526
Predicted score: 0.196 ----- True score: -0.714
```

```
Predicted score: -0.260 ----- True score: -0.547
Predicted score: 0.079 ----- True score: 0.625
Predicted score: 0.451 ----- True score: -0.477

#######################################

Predicted score: 0.185 ----- True score: 0.625
Predicted score: 0.144 ----- True score: -0.649
Predicted score: 0.264 ----- True score: 0.000
Predicted score: 0.844 ----- True score: -0.324
Predicted score: -0.211 ----- True score: 0.421
Predicted score: -0.127 ----- True score: -0.340
Predicted score: -0.734 ----- True score: 0.713
Predicted score: 0.213 ----- True score: -0.202
Predicted score: 0.411 ----- True score: -0.235
Predicted score: 0.107 ----- True score: 0.153
Predicted score: -0.832 ----- True score: -0.649
Predicted score: 0.496 ----- True score: 0.586
Predicted score: -0.538 ----- True score: 0.840
Predicted score: -0.842 ----- True score: 0.892
Predicted score: 0.348 ----- True score: 0.815
Predicted score: -0.637 ----- True score: 0.000
Predicted score: -0.246 ----- True score: 0.206
Predicted score: -0.380 ----- True score: 0.782
Predicted score: -0.833 ----- True score: -0.802
Predicted score: 0.466 ----- True score: 0.874
Predicted score: -0.325 ----- True score: 0.493
Predicted score: -0.141 ----- True score: 0.927
Predicted score: 0.854 ----- True score: 0.964
Predicted score: -0.379 ----- True score: 0.735
Predicted score: -0.808 ----- True score: 0.948
Predicted score: 0.729 ----- True score: 0.889
Predicted score: -0.466 ----- True score: 0.939
Predicted score: -0.310 ----- True score: 0.526
Predicted score: 0.561 ----- True score: -0.714
Predicted score: -0.221 ----- True score: -0.547
Predicted score: 0.214 ----- True score: 0.625
Predicted score: 0.089 ----- True score: -0.477
```

```
#####################################

Predicted score: 0.040 ----- True score: 0.625
Predicted score: 0.200 ----- True score: -0.649
Predicted score: 0.768 ----- True score: 0.000
Predicted score: 0.526 ----- True score: -0.324
Predicted score: 0.167 ----- True score: 0.421
Predicted score: -0.113 ----- True score: -0.340
Predicted score: -0.643 ----- True score: 0.713
Predicted score: -0.941 ----- True score: -0.202
Predicted score: -0.773 ----- True score: -0.235
Predicted score: 0.385 ----- True score: 0.153
Predicted score: -0.168 ----- True score: -0.649
Predicted score: 0.423 ----- True score: 0.586
Predicted score: 0.466 ----- True score: 0.840
Predicted score: 0.139 ----- True score: 0.892
Predicted score: -0.657 ----- True score: 0.815
Predicted score: 0.494 ----- True score: 0.000
Predicted score: -0.237 ----- True score: 0.206
Predicted score: -0.467 ----- True score: 0.782
Predicted score: 0.585 ----- True score: -0.802
Predicted score: -0.099 ----- True score: 0.874
Predicted score: -0.980 ----- True score: 0.493
Predicted score: -0.919 ----- True score: 0.927
Predicted score: -0.918 ----- True score: 0.964
Predicted score: 0.810 ----- True score: 0.735
Predicted score: -0.010 ----- True score: 0.948
Predicted score: 0.969 ----- True score: 0.889
Predicted score: -0.285 ----- True score: 0.939
Predicted score: 0.397 ----- True score: 0.526
Predicted score: 0.262 ----- True score: -0.714
Predicted score: 0.223 ----- True score: -0.547
Predicted score: 0.342 ----- True score: 0.625
Predicted score: -0.267 ----- True score: -0.477

#####################################
```

```
Predicted score: -0.979 ----- True score: 0.625
Predicted score: -0.665 ----- True score: -0.649
Predicted score: 0.891 ----- True score: 0.000
Predicted score: -0.781 ----- True score: -0.324
Predicted score: 0.854 ----- True score: 0.421
Predicted score: -0.589 ----- True score: -0.340
Predicted score: -0.215 ----- True score: 0.713
Predicted score: -0.912 ----- True score: -0.202
Predicted score: -0.134 ----- True score: -0.235
Predicted score: 0.589 ----- True score: 0.153
Predicted score: 0.049 ----- True score: -0.649
Predicted score: -0.804 ----- True score: 0.586
Predicted score: -0.146 ----- True score: 0.840
Predicted score: -0.851 ----- True score: 0.892
Predicted score: -0.102 ----- True score: 0.815
Predicted score: 0.794 ----- True score: 0.000
Predicted score: 0.715 ----- True score: 0.206
Predicted score: -0.078 ----- True score: 0.782
Predicted score: -0.543 ----- True score: -0.802
Predicted score: -0.349 ----- True score: 0.874
Predicted score: -0.449 ----- True score: 0.493
Predicted score: -0.765 ----- True score: 0.927
Predicted score: -0.850 ----- True score: 0.964
Predicted score: -0.111 ----- True score: 0.735
Predicted score: 0.082 ----- True score: 0.948
Predicted score: 0.155 ----- True score: 0.889
Predicted score: -0.403 ----- True score: 0.939
Predicted score: -0.218 ----- True score: 0.526
Predicted score: 0.249 ----- True score: -0.714
Predicted score: -0.561 ----- True score: -0.547
Predicted score: 0.247 ----- True score: 0.625
Predicted score: -0.823 ----- True score: -0.477

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Predicted score: 0.805 ----- True score: 0.625
Predicted score: 0.905 ----- True score: -0.649
Predicted score: 0.653 ----- True score: 0.000
```

```
Predicted score: -0.337 ----- True score: -0.324
Predicted score: 0.636 ----- True score: 0.421
Predicted score: -0.526 ----- True score: -0.340
Predicted score: 0.030 ----- True score: 0.713
Predicted score: -0.745 ----- True score: -0.202
Predicted score: 0.753 ----- True score: -0.235
Predicted score: 0.201 ----- True score: 0.153
Predicted score: 0.811 ----- True score: -0.649
Predicted score: 0.683 ----- True score: 0.586
Predicted score: -0.338 ----- True score: 0.840
Predicted score: 0.815 ----- True score: 0.892
Predicted score: 0.877 ----- True score: 0.815
Predicted score: 0.135 ----- True score: 0.000
Predicted score: 0.447 ----- True score: 0.206
Predicted score: 0.626 ----- True score: 0.782
Predicted score: -0.601 ----- True score: -0.802
Predicted score: 0.746 ----- True score: 0.874
Predicted score: 0.789 ----- True score: 0.493
Predicted score: -0.138 ----- True score: 0.927
Predicted score: -0.519 ----- True score: 0.964
Predicted score: 0.935 ----- True score: 0.735
Predicted score: 0.339 ----- True score: 0.948
Predicted score: 0.517 ----- True score: 0.889
Predicted score: 0.051 ----- True score: 0.939
Predicted score: 0.947 ----- True score: 0.526
Predicted score: -0.114 ----- True score: -0.714
Predicted score: 0.618 ----- True score: -0.547
Predicted score: 0.131 ----- True score: 0.625
Predicted score: -0.784 ----- True score: -0.477

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Predicted score: -0.133 ----- True score: 0.625
Predicted score: -0.646 ----- True score: -0.649
Predicted score: 0.050 ----- True score: 0.000
Predicted score: -0.639 ----- True score: -0.324
Predicted score: 0.760 ----- True score: 0.421
Predicted score: -0.938 ----- True score: -0.340
```

```
Predicted score: -0.987 ----- True score: 0.713
Predicted score: -0.502 ----- True score: -0.202
Predicted score: -0.287 ----- True score: -0.235
Predicted score: -0.042 ----- True score: 0.153
Predicted score: -0.214 ----- True score: -0.649
Predicted score: -0.356 ----- True score: 0.586
Predicted score: 0.536 ----- True score: 0.840
Predicted score: -0.236 ----- True score: 0.892
Predicted score: -0.465 ----- True score: 0.815
Predicted score: -0.177 ----- True score: 0.000
Predicted score: -0.616 ----- True score: 0.206
Predicted score: 0.479 ----- True score: 0.782
Predicted score: 0.609 ----- True score: -0.802
Predicted score: 0.912 ----- True score: 0.874
Predicted score: 0.084 ----- True score: 0.493
Predicted score: 0.756 ----- True score: 0.927
Predicted score: 0.669 ----- True score: 0.964
Predicted score: -0.861 ----- True score: 0.735
Predicted score: -0.767 ----- True score: 0.948
Predicted score: 0.382 ----- True score: 0.889
Predicted score: -0.643 ----- True score: 0.939
Predicted score: 0.923 ----- True score: 0.526
Predicted score: -0.130 ----- True score: -0.714
Predicted score: 0.428 ----- True score: -0.547
Predicted score: 0.842 ----- True score: 0.625
Predicted score: -0.539 ----- True score: -0.477

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Predicted score: -0.187 ----- True score: 0.625
Predicted score: 0.648 ----- True score: -0.649
Predicted score: 0.001 ----- True score: 0.000
Predicted score: 0.992 ----- True score: -0.324
Predicted score: -0.464 ----- True score: 0.421
Predicted score: -0.076 ----- True score: -0.340
Predicted score: -0.860 ----- True score: 0.713
Predicted score: -0.630 ----- True score: -0.202
Predicted score: 0.763 ----- True score: -0.235
```

```
Predicted score: -0.632 ----- True score: 0.153
Predicted score: -0.416 ----- True score: -0.649
Predicted score: -0.007 ----- True score: 0.586
Predicted score: 0.543 ----- True score: 0.840
Predicted score: -0.956 ----- True score: 0.892
Predicted score: 0.391 ----- True score: 0.815
Predicted score: 0.994 ----- True score: 0.000
Predicted score: -0.345 ----- True score: 0.206
Predicted score: -0.207 ----- True score: 0.782
Predicted score: -0.733 ----- True score: -0.802
Predicted score: 0.720 ----- True score: 0.874
Predicted score: -0.828 ----- True score: 0.493
Predicted score: -0.511 ----- True score: 0.927
Predicted score: -0.965 ----- True score: 0.964
Predicted score: 0.141 ----- True score: 0.735
Predicted score: 0.966 ----- True score: 0.948
Predicted score: -0.535 ----- True score: 0.889
Predicted score: -0.898 ----- True score: 0.939
Predicted score: -0.078 ----- True score: 0.526
Predicted score: -0.401 ----- True score: -0.714
Predicted score: 0.357 ----- True score: -0.547
Predicted score: -0.455 ----- True score: 0.625
Predicted score: -0.566 ----- True score: -0.477

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Predicted score: -0.468 ----- True score: 0.625
Predicted score: 0.719 ----- True score: -0.649
Predicted score: 0.724 ----- True score: 0.000
Predicted score: -0.158 ----- True score: -0.324
Predicted score: -0.877 ----- True score: 0.421
Predicted score: 0.988 ----- True score: -0.340
Predicted score: 0.408 ----- True score: 0.713
Predicted score: 0.355 ----- True score: -0.202
Predicted score: -0.086 ----- True score: -0.235
Predicted score: -0.482 ----- True score: 0.153
Predicted score: -0.880 ----- True score: -0.649
Predicted score: 0.794 ----- True score: 0.586
```

```
Predicted score: -0.599 ----- True score: 0.840
Predicted score: 0.827 ----- True score: 0.892
Predicted score: 0.683 ----- True score: 0.815
Predicted score: 0.223 ----- True score: 0.000
Predicted score: 0.248 ----- True score: 0.206
Predicted score: 0.492 ----- True score: 0.782
Predicted score: -0.785 ----- True score: -0.802
Predicted score: 0.478 ----- True score: 0.874
Predicted score: 0.568 ----- True score: 0.493
Predicted score: -0.270 ----- True score: 0.927
Predicted score: 0.999 ----- True score: 0.964
Predicted score: 0.731 ----- True score: 0.735
Predicted score: 0.903 ----- True score: 0.948
Predicted score: 0.572 ----- True score: 0.889
Predicted score: 0.702 ----- True score: 0.939
Predicted score: -0.146 ----- True score: 0.526
Predicted score: -0.226 ----- True score: -0.714
Predicted score: 0.097 ----- True score: -0.547
Predicted score: -0.732 ----- True score: 0.625
Predicted score: 0.504 ----- True score: -0.477

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Predicted score: -0.461 ----- True score: 0.625
Predicted score: 0.362 ----- True score: -0.649
Predicted score: -0.939 ----- True score: 0.000
Predicted score: -0.333 ----- True score: -0.324
Predicted score: -0.417 ----- True score: 0.421
Predicted score: 0.978 ----- True score: -0.340
Predicted score: -0.389 ----- True score: 0.713
Predicted score: 0.542 ----- True score: -0.202
Predicted score: 0.651 ----- True score: -0.235
Predicted score: -0.196 ----- True score: 0.153
Predicted score: 0.475 ----- True score: -0.649
Predicted score: -0.971 ----- True score: 0.586
Predicted score: 0.931 ----- True score: 0.840
Predicted score: 0.887 ----- True score: 0.892
Predicted score: -0.794 ----- True score: 0.815
```

```
Predicted score: 0.294 ----- True score: 0.000
Predicted score: 0.425 ----- True score: 0.206
Predicted score: -0.146 ----- True score: 0.782
Predicted score: -0.331 ----- True score: -0.802
Predicted score: -0.822 ----- True score: 0.874
Predicted score: 0.909 ----- True score: 0.493
Predicted score: 0.299 ----- True score: 0.927
Predicted score: -0.304 ----- True score: 0.964
Predicted score: -0.188 ----- True score: 0.735
Predicted score: 0.104 ----- True score: 0.948
Predicted score: -0.120 ----- True score: 0.889
Predicted score: 0.609 ----- True score: 0.939
Predicted score: -0.020 ----- True score: 0.526
Predicted score: 0.438 ----- True score: -0.714
Predicted score: 0.188 ----- True score: -0.547
Predicted score: -0.753 ----- True score: 0.625
Predicted score: -0.028 ----- True score: -0.477

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Predicted score: -0.600 ----- True score: 0.625
Predicted score: 0.061 ----- True score: -0.649
Predicted score: -0.963 ----- True score: 0.000
Predicted score: 0.375 ----- True score: -0.324
Predicted score: 0.184 ----- True score: 0.421
Predicted score: -0.112 ----- True score: -0.340
Predicted score: 0.767 ----- True score: 0.713
Predicted score: -0.424 ----- True score: -0.202
Predicted score: -0.672 ----- True score: -0.235
Predicted score: 0.985 ----- True score: 0.153
Predicted score: -0.317 ----- True score: -0.649
Predicted score: -0.400 ----- True score: 0.586
Predicted score: 0.928 ----- True score: 0.840
Predicted score: -0.962 ----- True score: 0.892
Predicted score: 0.210 ----- True score: 0.815
Predicted score: -0.970 ----- True score: 0.000
Predicted score: 0.792 ----- True score: 0.206
Predicted score: 0.191 ----- True score: 0.782
```

```
Predicted score: -0.765 ----- True score: -0.802
Predicted score: -0.135 ----- True score: 0.874
Predicted score: -0.035 ----- True score: 0.493
Predicted score: 0.709 ----- True score: 0.927
Predicted score: -0.108 ----- True score: 0.964
Predicted score: 0.084 ----- True score: 0.735
Predicted score: 0.278 ----- True score: 0.948
Predicted score: 0.260 ----- True score: 0.889
Predicted score: -0.315 ----- True score: 0.939
Predicted score: -0.891 ----- True score: 0.526
Predicted score: -0.962 ----- True score: -0.714
Predicted score: -0.238 ----- True score: -0.547
Predicted score: 0.218 ----- True score: 0.625
Predicted score: 0.147 ----- True score: -0.477

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Predicted score: -0.856 ----- True score: 0.625
Predicted score: 0.474 ----- True score: -0.649
Predicted score: 0.517 ----- True score: 0.000
Predicted score: -0.811 ----- True score: -0.324
Predicted score: -0.084 ----- True score: 0.421
Predicted score: 0.966 ----- True score: -0.340
Predicted score: -0.815 ----- True score: 0.713
Predicted score: 0.059 ----- True score: -0.202
Predicted score: -0.021 ----- True score: -0.235
Predicted score: 0.231 ----- True score: 0.153
Predicted score: -0.013 ----- True score: -0.649
Predicted score: -0.318 ----- True score: 0.586
Predicted score: 0.810 ----- True score: 0.840
Predicted score: -0.393 ----- True score: 0.892
Predicted score: 0.249 ----- True score: 0.815
Predicted score: -0.231 ----- True score: 0.000
Predicted score: -0.295 ----- True score: 0.206
Predicted score: 0.214 ----- True score: 0.782
Predicted score: 0.261 ----- True score: -0.802
Predicted score: 0.924 ----- True score: 0.874
Predicted score: -0.980 ----- True score: 0.493
```

```
Predicted score: -0.845 ----- True score: 0.927
Predicted score: -0.130 ----- True score: 0.964
Predicted score: 0.132 ----- True score: 0.735
Predicted score: 0.292 ----- True score: 0.948
Predicted score: -0.380 ----- True score: 0.889
Predicted score: 0.982 ----- True score: 0.939
Predicted score: 0.636 ----- True score: 0.526
Predicted score: 0.418 ----- True score: -0.714
Predicted score: 0.626 ----- True score: -0.547
Predicted score: -0.569 ----- True score: 0.625
Predicted score: 0.120 ----- True score: -0.477

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Predicted score: -0.600 ----- True score: 0.625
Predicted score: 0.982 ----- True score: -0.649
Predicted score: 0.295 ----- True score: 0.000
Predicted score: 0.090 ----- True score: -0.324
Predicted score: -0.993 ----- True score: 0.421
Predicted score: 0.620 ----- True score: -0.340
Predicted score: 0.608 ----- True score: 0.713
Predicted score: -0.597 ----- True score: -0.202
Predicted score: 0.439 ----- True score: -0.235
Predicted score: -0.841 ----- True score: 0.153
Predicted score: 0.848 ----- True score: -0.649
Predicted score: 0.089 ----- True score: 0.586
Predicted score: 0.251 ----- True score: 0.840
Predicted score: -0.665 ----- True score: 0.892
Predicted score: -0.538 ----- True score: 0.815
Predicted score: -0.800 ----- True score: 0.000
Predicted score: -0.218 ----- True score: 0.206
Predicted score: 0.033 ----- True score: 0.782
Predicted score: -0.936 ----- True score: -0.802
Predicted score: -0.336 ----- True score: 0.874
Predicted score: 0.315 ----- True score: 0.493
Predicted score: 0.464 ----- True score: 0.927
Predicted score: 0.642 ----- True score: 0.964
Predicted score: -0.608 ----- True score: 0.735
```

```
Predicted score: 0.893 ----- True score: 0.948
Predicted score: 0.463 ----- True score: 0.889
Predicted score: 0.271 ----- True score: 0.939
Predicted score: 0.992 ----- True score: 0.526
Predicted score: -0.829 ----- True score: -0.714
Predicted score: 0.798 ----- True score: -0.547
Predicted score: 0.015 ----- True score: 0.625
Predicted score: 0.283 ----- True score: -0.477

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Predicted score: 0.414 ----- True score: 0.625
Predicted score: -0.040 ----- True score: -0.649
Predicted score: 0.042 ----- True score: 0.000
Predicted score: -0.215 ----- True score: -0.324
Predicted score: 0.252 ----- True score: 0.421
Predicted score: -0.900 ----- True score: -0.340
Predicted score: -0.102 ----- True score: 0.713
Predicted score: -0.912 ----- True score: -0.202
Predicted score: 0.189 ----- True score: -0.235
Predicted score: 0.217 ----- True score: 0.153
Predicted score: -0.938 ----- True score: -0.649
Predicted score: -0.397 ----- True score: 0.586
Predicted score: 0.488 ----- True score: 0.840
Predicted score: 0.331 ----- True score: 0.892
Predicted score: 0.545 ----- True score: 0.815
Predicted score: -0.737 ----- True score: 0.000
Predicted score: 0.462 ----- True score: 0.206
Predicted score: 0.500 ----- True score: 0.782
Predicted score: 0.584 ----- True score: -0.802
Predicted score: 0.385 ----- True score: 0.874
Predicted score: 0.354 ----- True score: 0.493
Predicted score: 0.482 ----- True score: 0.927
Predicted score: -0.410 ----- True score: 0.964
Predicted score: 0.461 ----- True score: 0.735
Predicted score: -0.805 ----- True score: 0.948
Predicted score: -0.180 ----- True score: 0.889
Predicted score: 0.591 ----- True score: 0.939
```

```
Predicted score: 0.841 ----- True score: 0.526
Predicted score: -0.099 ----- True score: -0.714
Predicted score: -0.071 ----- True score: -0.547
Predicted score: -0.176 ----- True score: 0.625
Predicted score: 0.204 ----- True score: -0.477

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Predicted score: 0.870 ----- True score: 0.625
Predicted score: 0.561 ----- True score: -0.649
Predicted score: 0.779 ----- True score: 0.000
Predicted score: 0.366 ----- True score: -0.324
Predicted score: -0.134 ----- True score: 0.421
Predicted score: -0.945 ----- True score: -0.340
Predicted score: -0.176 ----- True score: 0.713
Predicted score: 0.851 ----- True score: -0.202
Predicted score: 0.254 ----- True score: -0.235
Predicted score: -0.020 ----- True score: 0.153
Predicted score: -0.647 ----- True score: -0.649
Predicted score: -0.833 ----- True score: 0.586
Predicted score: -0.930 ----- True score: 0.840
Predicted score: 0.879 ----- True score: 0.892
Predicted score: -0.282 ----- True score: 0.815
Predicted score: -0.647 ----- True score: 0.000
Predicted score: 0.034 ----- True score: 0.206
Predicted score: 0.271 ----- True score: 0.782
Predicted score: 0.564 ----- True score: -0.802
Predicted score: 0.649 ----- True score: 0.874
Predicted score: -0.101 ----- True score: 0.493
Predicted score: 0.786 ----- True score: 0.927
Predicted score: 0.236 ----- True score: 0.964
Predicted score: -0.468 ----- True score: 0.735
Predicted score: -0.299 ----- True score: 0.948
Predicted score: -0.155 ----- True score: 0.889
Predicted score: 0.635 ----- True score: 0.939
Predicted score: -0.870 ----- True score: 0.526
Predicted score: -0.655 ----- True score: -0.714
Predicted score: 0.758 ----- True score: -0.547
```

```
Predicted score: 0.172 ----- True score: 0.625
Predicted score: -0.429 ----- True score: -0.477

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Predicted score: 0.084 ----- True score: 0.625
Predicted score: -0.823 ----- True score: -0.649
Predicted score: -0.724 ----- True score: 0.000
Predicted score: 0.372 ----- True score: -0.324
Predicted score: 0.060 ----- True score: 0.421
Predicted score: -0.528 ----- True score: -0.340
Predicted score: -0.969 ----- True score: 0.713
Predicted score: 0.487 ----- True score: -0.202
Predicted score: -0.052 ----- True score: -0.235
Predicted score: 0.627 ----- True score: 0.153
Predicted score: 0.941 ----- True score: -0.649
Predicted score: -0.081 ----- True score: 0.586
Predicted score: 0.598 ----- True score: 0.840
Predicted score: -0.670 ----- True score: 0.892
Predicted score: 0.925 ----- True score: 0.815
Predicted score: -0.125 ----- True score: 0.000
Predicted score: -0.169 ----- True score: 0.206
Predicted score: -0.785 ----- True score: 0.782
Predicted score: 0.820 ----- True score: -0.802
Predicted score: 0.190 ----- True score: 0.874
Predicted score: -0.383 ----- True score: 0.493
Predicted score: 0.952 ----- True score: 0.927
Predicted score: -0.798 ----- True score: 0.964
Predicted score: -0.282 ----- True score: 0.735
Predicted score: 0.062 ----- True score: 0.948
Predicted score: -0.367 ----- True score: 0.889
Predicted score: -0.900 ----- True score: 0.939
Predicted score: 0.554 ----- True score: 0.526
Predicted score: 0.154 ----- True score: -0.714
Predicted score: 0.746 ----- True score: -0.547
Predicted score: 0.591 ----- True score: 0.625
Predicted score: -0.516 ----- True score: -0.477
```

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Predicted score: 0.890 ----- True score: 0.625
Predicted score: 0.218 ----- True score: -0.649
Predicted score: -0.178 ----- True score: 0.000
Predicted score: -0.742 ----- True score: -0.324
Predicted score: 0.292 ----- True score: 0.421
Predicted score: 0.630 ----- True score: -0.340
Predicted score: -0.141 ----- True score: 0.713
Predicted score: 0.162 ----- True score: -0.202
Predicted score: 0.398 ----- True score: -0.235
Predicted score: -0.853 ----- True score: 0.153
Predicted score: 0.062 ----- True score: -0.649
Predicted score: -0.331 ----- True score: 0.586
Predicted score: -0.664 ----- True score: 0.840
Predicted score: -0.357 ----- True score: 0.892
Predicted score: -0.423 ----- True score: 0.815
Predicted score: 0.563 ----- True score: 0.000
Predicted score: -0.699 ----- True score: 0.206
Predicted score: -0.286 ----- True score: 0.782
Predicted score: -0.122 ----- True score: -0.802
Predicted score: -0.298 ----- True score: 0.874
Predicted score: -0.924 ----- True score: 0.493
Predicted score: 0.633 ----- True score: 0.927
Predicted score: 0.098 ----- True score: 0.964
Predicted score: 0.380 ----- True score: 0.735
Predicted score: 0.207 ----- True score: 0.948
Predicted score: -0.749 ----- True score: 0.889
Predicted score: -0.781 ----- True score: 0.939
Predicted score: 0.190 ----- True score: 0.526
Predicted score: 0.200 ----- True score: -0.714
Predicted score: -0.764 ----- True score: -0.547
Predicted score: 0.555 ----- True score: 0.625
Predicted score: -0.296 ----- True score: -0.477

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Predicted score: -0.885 ----- True score: 0.625
```

```
Predicted score: -0.247 ----- True score: -0.649
Predicted score: 0.134 ----- True score: 0.000
Predicted score: -0.226 ----- True score: -0.324
Predicted score: -0.123 ----- True score: 0.421
Predicted score: 0.828 ----- True score: -0.340
Predicted score: -0.230 ----- True score: 0.713
Predicted score: 0.542 ----- True score: -0.202
Predicted score: -0.144 ----- True score: -0.235
Predicted score: -0.803 ----- True score: 0.153
Predicted score: 0.386 ----- True score: -0.649
Predicted score: 0.885 ----- True score: 0.586
Predicted score: 0.609 ----- True score: 0.840
Predicted score: -0.251 ----- True score: 0.892
Predicted score: 0.712 ----- True score: 0.815
Predicted score: -0.244 ----- True score: 0.000
Predicted score: -0.288 ----- True score: 0.206
Predicted score: -0.501 ----- True score: 0.782
Predicted score: 0.667 ----- True score: -0.802
Predicted score: 0.755 ----- True score: 0.874
Predicted score: 0.430 ----- True score: 0.493
Predicted score: 0.192 ----- True score: 0.927
Predicted score: 0.581 ----- True score: 0.964
Predicted score: -0.648 ----- True score: 0.735
Predicted score: 0.793 ----- True score: 0.948
Predicted score: -0.094 ----- True score: 0.889
Predicted score: 0.814 ----- True score: 0.939
Predicted score: 0.264 ----- True score: 0.526
Predicted score: 0.354 ----- True score: -0.714
Predicted score: 0.663 ----- True score: -0.547
Predicted score: 0.707 ----- True score: 0.625
Predicted score: -0.301 ----- True score: -0.477

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Predicted score: -0.027 ----- True score: 0.625
Predicted score: -0.108 ----- True score: -0.649
Predicted score: 0.353 ----- True score: 0.000
Predicted score: -0.158 ----- True score: -0.324
```

```
Predicted score: 0.108 ----- True score: 0.421
Predicted score: -0.749 ----- True score: -0.340
Predicted score: -0.265 ----- True score: 0.713
Predicted score: -0.732 ----- True score: -0.202
Predicted score: -0.314 ----- True score: -0.235
Predicted score: -0.232 ----- True score: 0.153
Predicted score: 0.872 ----- True score: -0.649
Predicted score: -0.663 ----- True score: 0.586
Predicted score: -0.911 ----- True score: 0.840
Predicted score: -0.523 ----- True score: 0.892
Predicted score: -0.309 ----- True score: 0.815
Predicted score: -0.302 ----- True score: 0.000
Predicted score: -0.798 ----- True score: 0.206
Predicted score: -0.238 ----- True score: 0.782
Predicted score: -0.635 ----- True score: -0.802
Predicted score: -0.378 ----- True score: 0.874
Predicted score: 0.622 ----- True score: 0.493
Predicted score: -0.905 ----- True score: 0.927
Predicted score: -0.559 ----- True score: 0.964
Predicted score: -0.568 ----- True score: 0.735
Predicted score: 0.075 ----- True score: 0.948
Predicted score: 0.886 ----- True score: 0.889
Predicted score: 0.748 ----- True score: 0.939
Predicted score: 0.334 ----- True score: 0.526
Predicted score: -0.562 ----- True score: -0.714
Predicted score: 0.209 ----- True score: -0.547
Predicted score: -0.855 ----- True score: 0.625
Predicted score: -0.364 ----- True score: -0.477

########################################

Predicted score: 0.242 ----- True score: 0.625
Predicted score: 0.091 ----- True score: -0.649
Predicted score: 0.214 ----- True score: 0.000
Predicted score: -0.657 ----- True score: -0.324
Predicted score: -0.544 ----- True score: 0.421
Predicted score: 0.061 ----- True score: -0.340
Predicted score: -0.131 ----- True score: 0.713
```

```
Predicted score: -0.983 ----- True score: -0.202
Predicted score: 0.955 ----- True score: -0.235
Predicted score: 0.866 ----- True score: 0.153
Predicted score: -0.508 ----- True score: -0.649
Predicted score: 0.254 ----- True score: 0.586
Predicted score: -0.981 ----- True score: 0.840
Predicted score: 0.926 ----- True score: 0.892
Predicted score: -0.490 ----- True score: 0.815
Predicted score: -0.919 ----- True score: 0.000
Predicted score: 0.651 ----- True score: 0.206
Predicted score: 0.581 ----- True score: 0.782
Predicted score: -0.265 ----- True score: -0.802
Predicted score: 0.344 ----- True score: 0.874
Predicted score: -0.254 ----- True score: 0.493
Predicted score: 0.322 ----- True score: 0.927
Predicted score: -0.247 ----- True score: 0.964
Predicted score: -0.520 ----- True score: 0.735
Predicted score: 0.388 ----- True score: 0.948
Predicted score: -0.335 ----- True score: 0.889
Predicted score: 0.956 ----- True score: 0.939
Predicted score: 0.797 ----- True score: 0.526
Predicted score: 0.998 ----- True score: -0.714
Predicted score: -0.456 ----- True score: -0.547
Predicted score: 0.559 ----- True score: 0.625
Predicted score: -0.175 ----- True score: -0.477

########################################

Predicted score: -0.777 ----- True score: 0.625
Predicted score: 0.715 ----- True score: -0.649
Predicted score: 0.878 ----- True score: 0.000
Predicted score: 0.272 ----- True score: -0.324
Predicted score: 0.373 ----- True score: 0.421
Predicted score: -0.681 ----- True score: -0.340
Predicted score: -0.333 ----- True score: 0.713
Predicted score: -0.947 ----- True score: -0.202
Predicted score: -0.115 ----- True score: -0.235
Predicted score: 0.291 ----- True score: 0.153
```

```
Predicted score: -0.438 ----- True score: -0.649
Predicted score: 0.114 ----- True score: 0.586
Predicted score: 0.667 ----- True score: 0.840
Predicted score: 0.226 ----- True score: 0.892
Predicted score: -0.408 ----- True score: 0.815
Predicted score: 0.128 ----- True score: 0.000
Predicted score: -0.673 ----- True score: 0.206
Predicted score: 0.349 ----- True score: 0.782
Predicted score: -0.016 ----- True score: -0.802
Predicted score: 0.355 ----- True score: 0.874
Predicted score: -0.800 ----- True score: 0.493
Predicted score: -0.277 ----- True score: 0.927
Predicted score: 0.189 ----- True score: 0.964
Predicted score: 0.633 ----- True score: 0.735
Predicted score: 0.986 ----- True score: 0.948
Predicted score: 0.018 ----- True score: 0.889
Predicted score: -0.646 ----- True score: 0.939
Predicted score: -0.417 ----- True score: 0.526
Predicted score: 0.058 ----- True score: -0.714
Predicted score: 0.340 ----- True score: -0.547
Predicted score: 0.283 ----- True score: 0.625
Predicted score: -0.002 ----- True score: -0.477

########################################

Predicted score: -0.097 ----- True score: 0.625
Predicted score: 0.385 ----- True score: -0.649
Predicted score: -0.087 ----- True score: 0.000
Predicted score: -0.503 ----- True score: -0.324
Predicted score: 0.003 ----- True score: 0.421
Predicted score: -0.957 ----- True score: -0.340
Predicted score: -0.630 ----- True score: 0.713
Predicted score: -0.499 ----- True score: -0.202
Predicted score: -0.485 ----- True score: -0.235
Predicted score: -0.935 ----- True score: 0.153
Predicted score: 0.764 ----- True score: -0.649
Predicted score: -0.549 ----- True score: 0.586
Predicted score: 0.919 ----- True score: 0.840
```

Predicted score: -0.518 ----- True score: 0.892
Predicted score: -0.317 ----- True score: 0.815
Predicted score: 0.250 ----- True score: 0.000
Predicted score: -0.623 ----- True score: 0.206
Predicted score: 0.598 ----- True score: 0.782
Predicted score: 0.438 ----- True score: -0.802
Predicted score: 0.499 ----- True score: 0.874
Predicted score: 0.168 ----- True score: 0.493
Predicted score: -0.552 ----- True score: 0.927
Predicted score: -0.079 ----- True score: 0.964
Predicted score: 0.919 ----- True score: 0.735
Predicted score: 0.353 ----- True score: 0.948
Predicted score: -0.250 ----- True score: 0.889
Predicted score: 0.739 ----- True score: 0.939
Predicted score: 0.616 ----- True score: 0.526
Predicted score: -0.121 ----- True score: -0.714
Predicted score: 0.655 ----- True score: -0.547
Predicted score: -0.139 ----- True score: 0.625
Predicted score: 0.103 ----- True score: -0.477

##

Predicted score: 0.560 ----- True score: 0.625
Predicted score: -0.021 ----- True score: -0.649
Predicted score: 0.191 ----- True score: 0.000
Predicted score: 0.107 ----- True score: -0.324
Predicted score: -0.678 ----- True score: 0.421
Predicted score: -0.300 ----- True score: -0.340
Predicted score: -0.447 ----- True score: 0.713
Predicted score: -0.886 ----- True score: -0.202
Predicted score: -0.549 ----- True score: -0.235
Predicted score: -0.543 ----- True score: 0.153
Predicted score: -0.840 ----- True score: -0.649
Predicted score: -0.905 ----- True score: 0.586
Predicted score: 0.834 ----- True score: 0.840
Predicted score: 0.777 ----- True score: 0.892
Predicted score: 0.472 ----- True score: 0.815
Predicted score: 0.885 ----- True score: 0.000

Predicted score: 0.127 ----- True score: 0.206
Predicted score: -0.093 ----- True score: 0.782
Predicted score: -0.437 ----- True score: -0.802
Predicted score: 0.695 ----- True score: 0.874
Predicted score: -0.885 ----- True score: 0.493
Predicted score: 0.190 ----- True score: 0.927
Predicted score: 0.940 ----- True score: 0.964
Predicted score: -0.475 ----- True score: 0.735
Predicted score: 0.649 ----- True score: 0.948
Predicted score: 0.178 ----- True score: 0.889
Predicted score: -0.167 ----- True score: 0.939
Predicted score: 0.838 ----- True score: 0.526
Predicted score: -0.253 ----- True score: -0.714
Predicted score: 0.674 ----- True score: -0.547
Predicted score: -0.729 ----- True score: 0.625
Predicted score: 0.463 ----- True score: -0.477

##

Predicted score: 0.217 ----- True score: 0.625
Predicted score: 0.687 ----- True score: -0.649
Predicted score: 0.787 ----- True score: 0.000
Predicted score: 0.050 ----- True score: -0.324
Predicted score: -0.892 ----- True score: 0.421
Predicted score: 0.585 ----- True score: -0.340
Predicted score: -0.112 ----- True score: 0.713
Predicted score: 0.997 ----- True score: -0.202
Predicted score: -0.670 ----- True score: -0.235
Predicted score: 0.311 ----- True score: 0.153
Predicted score: 0.705 ----- True score: -0.649
Predicted score: -0.187 ----- True score: 0.586
Predicted score: 0.157 ----- True score: 0.840
Predicted score: 0.546 ----- True score: 0.892
Predicted score: 0.271 ----- True score: 0.815
Predicted score: -0.801 ----- True score: 0.000
Predicted score: -0.327 ----- True score: 0.206
Predicted score: -0.610 ----- True score: 0.782
Predicted score: 0.444 ----- True score: -0.802

```
Predicted score: -0.232 ----- True score: 0.874
Predicted score: -0.025 ----- True score: 0.493
Predicted score: -0.815 ----- True score: 0.927
Predicted score: 0.999 ----- True score: 0.964
Predicted score: 0.196 ----- True score: 0.735
Predicted score: 0.001 ----- True score: 0.948
Predicted score: 0.933 ----- True score: 0.889
Predicted score: 0.809 ----- True score: 0.939
Predicted score: -0.443 ----- True score: 0.526
Predicted score: -0.292 ----- True score: -0.714
Predicted score: 0.857 ----- True score: -0.547
Predicted score: 0.027 ----- True score: 0.625
Predicted score: 0.728 ----- True score: -0.477

########################################

Predicted score: -0.852 ----- True score: 0.625
Predicted score: 0.985 ----- True score: -0.649
Predicted score: 0.412 ----- True score: 0.000
Predicted score: 0.953 ----- True score: -0.324
Predicted score: -0.179 ----- True score: 0.421
Predicted score: -0.506 ----- True score: -0.340
Predicted score: 0.668 ----- True score: 0.713
Predicted score: -0.648 ----- True score: -0.202
Predicted score: 0.324 ----- True score: -0.235
Predicted score: -0.354 ----- True score: 0.153
Predicted score: -0.945 ----- True score: -0.649
Predicted score: -0.235 ----- True score: 0.586
Predicted score: 0.375 ----- True score: 0.840
Predicted score: 0.979 ----- True score: 0.892
Predicted score: 0.436 ----- True score: 0.815
Predicted score: 0.594 ----- True score: 0.000
Predicted score: 0.263 ----- True score: 0.206
Predicted score: 0.813 ----- True score: 0.782
Predicted score: 0.645 ----- True score: -0.802
Predicted score: 0.499 ----- True score: 0.874
Predicted score: 0.888 ----- True score: 0.493
Predicted score: -0.255 ----- True score: 0.927
```

```
Predicted score: 0.464 ----- True score: 0.964
Predicted score: 0.997 ----- True score: 0.735
Predicted score: 0.211 ----- True score: 0.948
Predicted score: -0.617 ----- True score: 0.889
Predicted score: 0.299 ----- True score: 0.939
Predicted score: 0.328 ----- True score: 0.526
Predicted score: -0.178 ----- True score: -0.714
Predicted score: 0.631 ----- True score: -0.547
Predicted score: -0.088 ----- True score: 0.625
Predicted score: 0.675 ----- True score: -0.477

########################################

Predicted score: 0.172 ----- True score: 0.625
Predicted score: -0.646 ----- True score: -0.649
Predicted score: 0.966 ----- True score: 0.000
Predicted score: 0.038 ----- True score: -0.324
Predicted score: -0.191 ----- True score: 0.421
Predicted score: 0.310 ----- True score: -0.340
Predicted score: -0.859 ----- True score: 0.713
Predicted score: -0.210 ----- True score: -0.202
Predicted score: 0.713 ----- True score: -0.235
Predicted score: 0.400 ----- True score: 0.153
Predicted score: 0.423 ----- True score: -0.649
Predicted score: -0.972 ----- True score: 0.586
Predicted score: 0.677 ----- True score: 0.840
Predicted score: -0.744 ----- True score: 0.892
Predicted score: -0.539 ----- True score: 0.815
Predicted score: 0.974 ----- True score: 0.000
Predicted score: 0.871 ----- True score: 0.206
Predicted score: -0.233 ----- True score: 0.782
Predicted score: 0.025 ----- True score: -0.802
Predicted score: -0.775 ----- True score: 0.874
Predicted score: 0.955 ----- True score: 0.493
Predicted score: -0.224 ----- True score: 0.927
Predicted score: 0.017 ----- True score: 0.964
Predicted score: -0.481 ----- True score: 0.735
Predicted score: -0.197 ----- True score: 0.948
```

```
Predicted score: 0.622 ----- True score: 0.889
Predicted score: 0.425 ----- True score: 0.939
Predicted score: -0.393 ----- True score: 0.526
Predicted score: -0.867 ----- True score: -0.714
Predicted score: 0.720 ----- True score: -0.547
Predicted score: 0.628 ----- True score: 0.625
Predicted score: -0.875 ----- True score: -0.477

########################################

Predicted score: 0.604 ----- True score: 0.625
Predicted score: 0.256 ----- True score: -0.649
Predicted score: -0.194 ----- True score: 0.000
Predicted score: 0.476 ----- True score: -0.324
Predicted score: -0.170 ----- True score: 0.421
Predicted score: 0.779 ----- True score: -0.340
Predicted score: -0.158 ----- True score: 0.713
Predicted score: -0.898 ----- True score: -0.202
Predicted score: -0.966 ----- True score: -0.235
Predicted score: -0.152 ----- True score: 0.153
Predicted score: -0.669 ----- True score: -0.649
Predicted score: 0.720 ----- True score: 0.586
Predicted score: 0.281 ----- True score: 0.840
Predicted score: 0.650 ----- True score: 0.892
Predicted score: 0.636 ----- True score: 0.815
Predicted score: -0.971 ----- True score: 0.000
Predicted score: -0.868 ----- True score: 0.206
Predicted score: -0.100 ----- True score: 0.782
Predicted score: -0.642 ----- True score: -0.802
Predicted score: 0.481 ----- True score: 0.874
Predicted score: 0.233 ----- True score: 0.493
Predicted score: 0.124 ----- True score: 0.927
Predicted score: -0.864 ----- True score: 0.964
Predicted score: 0.396 ----- True score: 0.735
Predicted score: 0.822 ----- True score: 0.948
Predicted score: 0.502 ----- True score: 0.889
Predicted score: 0.261 ----- True score: 0.939
Predicted score: -0.824 ----- True score: 0.526
```

```
Predicted score: -0.113 ----- True score: -0.714
Predicted score: -0.346 ----- True score: -0.547
Predicted score: 0.793 ----- True score: 0.625
Predicted score: 0.109 ----- True score: -0.477

########################################

Predicted score: 0.714 ----- True score: 0.625
Predicted score: 0.328 ----- True score: -0.649
Predicted score: -0.798 ----- True score: 0.000
Predicted score: 0.172 ----- True score: -0.324
Predicted score: -0.463 ----- True score: 0.421
Predicted score: -0.269 ----- True score: -0.340
Predicted score: -0.887 ----- True score: 0.713
Predicted score: 0.991 ----- True score: -0.202
Predicted score: -0.932 ----- True score: -0.235
Predicted score: -0.964 ----- True score: 0.153
Predicted score: 0.284 ----- True score: -0.649
Predicted score: -0.591 ----- True score: 0.586
Predicted score: 0.423 ----- True score: 0.840
Predicted score: -0.846 ----- True score: 0.892
Predicted score: -0.161 ----- True score: 0.815
Predicted score: 0.702 ----- True score: 0.000
Predicted score: 0.050 ----- True score: 0.206
Predicted score: 0.360 ----- True score: 0.782
Predicted score: -0.073 ----- True score: -0.802
Predicted score: 0.772 ----- True score: 0.874
Predicted score: 0.116 ----- True score: 0.493
Predicted score: -0.575 ----- True score: 0.927
Predicted score: -0.026 ----- True score: 0.964
Predicted score: 0.222 ----- True score: 0.735
Predicted score: 0.785 ----- True score: 0.948
Predicted score: 0.281 ----- True score: 0.889
Predicted score: -0.461 ----- True score: 0.939
Predicted score: 0.977 ----- True score: 0.526
Predicted score: 0.185 ----- True score: -0.714
Predicted score: -0.660 ----- True score: -0.547
Predicted score: -0.363 ----- True score: 0.625
```

MAE for each iteration

In [12]:

```
#measure performance with mae
def mae(y_true, y_pred):
    return (y_true-y_pred).abs().mean()

mae_values = []

for i in range(0,len(true_values)):
    mae_values.append(mae(pd.Series(true_values[i]), pd.Series(predicted_values[
i])))
    print("{}). MAE: {}\n".format(i+1, mae_values[i]))
```

```
1). MAE: 0.762960766165393

2). MAE: 0.7953170469282193

3). MAE: 0.7670256720110713

4). MAE: 0.7285598057045028

5). MAE: 0.6819337595437465

6). MAE: 0.7646435204228411

7). MAE: 0.7133298213326495

8). MAE: 0.7365268671710558

9). MAE: 0.8221376898501577

10). MAE: 0.9631514555532544

11). MAE: 0.7345095491651649

12). MAE: 0.8091404470255695

13). MAE: 0.7369181369377436
```

14). MAE: 0.701615874128006

15). MAE: 0.7529262292409338

16). MAE: 0.808990413000826

17). MAE: 0.5218124141308754

18). MAE: 0.6142489666248703

19). MAE: 0.8144310993389973

20). MAE: 0.522452237310738

21). MAE: 0.811128529732073

22). MAE: 0.6465587244442621

23). MAE: 0.7640146311331133

24). MAE: 0.739660462499448

25). MAE: 0.5501914768861852

26). MAE: 0.7009656141984687

27). MAE: 0.7555975750385838

28). MAE: 0.7637694171259557

29). MAE: 0.6136452317555596

30). MAE: 0.7425012792140305

31). MAE: 0.6527543737113077

32). MAE: 0.670500637959913

Mean MAE for all the iterations

In [20]:
```
#calculating mean MAE from above

print("Mean MAE: {:.4f}".format(pd.Series(mae_values).mean()))
```

```
Mean MAE: 0.7169
```

Understand if we have done better than random

To do this we are just going to subtract this mean to our original MAE. If a positive number comes up, we are doing better than the random algorithm.

In [14]:
```
#calculating the mean of the variations
dif = mae(pd.Series(true_values), pd.Series(predicted_values)) - pd.Series(mae_
values).mean()
print("Mean variation: {:.4f}".format(dif))
```

```
Mean variation: 0.1421
```

Conclusions

We are doing slightly better than a random algorithm... which is at least something!

Probably with more data we would have achieved different results but, we can still say that our algorithm is doing something good since we have obtained better results than the baseline.