Working with the bci and eye-tracking data

Eye-Data

- From the Eye-tracking devices we get the coordinates
- Also, we calculate fixation points, which means, small areas a user is looking at for a certain amount of time

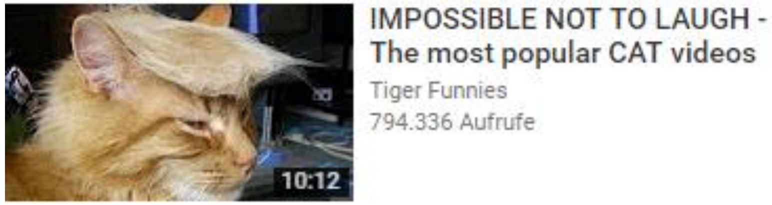
BCI-Data

- The raw Data from the BCI is just electric signals from the electrodes
- This data has to be processed, so you get the assumed feelings of the user at a given time
- The final Data can be shown in multiple Graphs, one for each feeling

Suggestions

Analyse the Data that was recorded during a Video

Classifying Videos

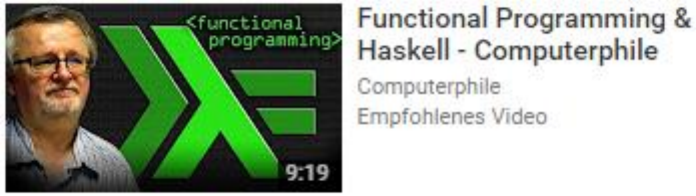


IMPOSSIBLE NOT TO LAUGH - The most popular CAT videos

Tiger Funnies

794.336 Aufrufe

😂



Functional Programming & Haskell - Computerphile

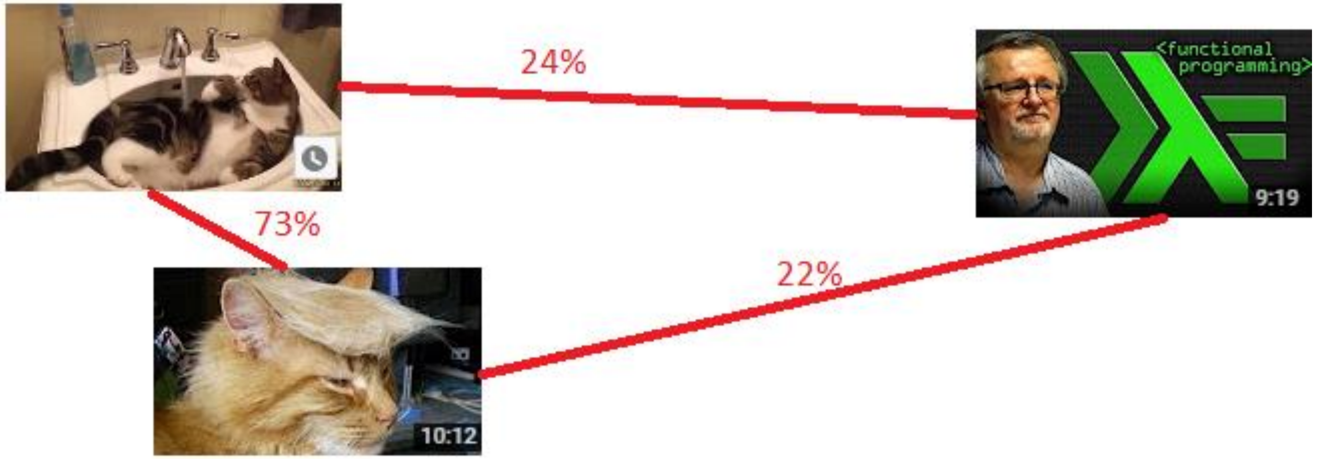
Computerphile

Empfohlenes Video

😴

- Idea:
  - Calculate the average or major feelings of all viewers of a video
  - tell, if a video is happy, sad,or exciting …
- The results…
  - …can be used to fill the caroussels with different categories of videos
  - …can be displayed next to videos (with an emoticon), so the users can choose between search results more efficiently
  - … can be used, to improve search results (users, who like sad videos will get more sad videos as results)

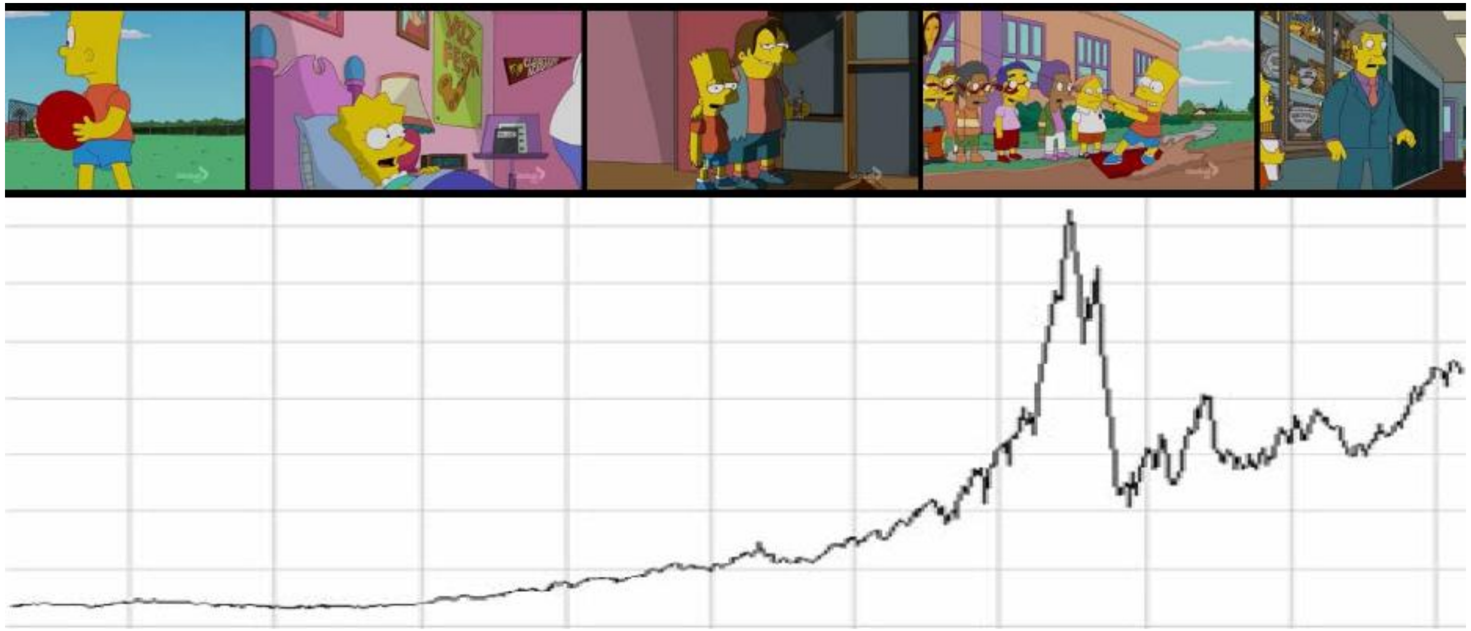
Comparing Videos



- Idea
  - Calculate the average of all viewers of a video for all feelings
  - With this data, calculate how similar two videos are
- The results can be used, to improve search results
  - The videos in the search results would get a score, based on how the user rated similar videos.
  - This score would be used to sort the videos

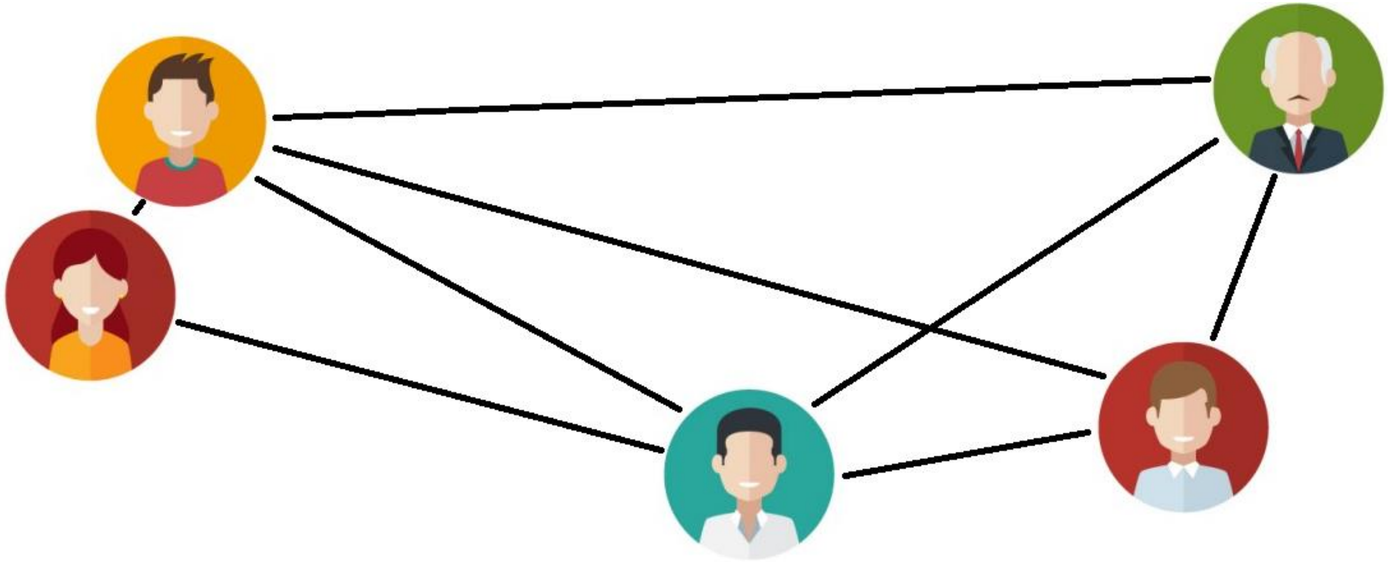
Find important parts of the video

- Scan the bci-data for significant parts
  - for example, does the average excitement of all users suddenly increases?
- Analyze the results
  - Does it work / make sense?
- The results …
  - … can be used to improve the preview in the search results



Comparing users

- Compare both, eye- and BCI-data for all pairs of users
  - Jannis and Yessi will explain it for the eye-part in their presentation
- The final result will be called „similarity“
- The results can be used to improve the searching algorithm
  - users get videos as search results, which similar users already liked (next sheet)



Search-Algorithm, explained with example (1)

- Min has similarity scores for 3 other users:
  - Daniel: 75%, Mariya: 50%, Benny: 25%
- Min searches for „cat“. there are 3 videos for „cat“ (in our data-base):
  - „ Nyan Cat“, „ Grumpy Cat“, „Simon‘s Cat“
- Each of this videos is rated by the other users:
  - Daniel: {„Nyan Cat“ : ★⯪☆☆☆ „Grumpy Cat“ : ★★★★⯪ „Simon‘s Cat“ : ★★⯪☆☆ }
  - Mariya:{„Nyan Cat“ : ★⯪☆☆☆ „Grumpy Cat“ : ★⯪☆☆☆ „Simon‘s Cat“ : ★★★⯪☆ }
  - Benny: {„Nyan Cat“ : ★★★★⯪ „Grumpy Cat“ : ★★☆☆☆ „Simon‘s Cat“ : ★★⯪☆☆ }
- Because Daniel more similar to Min, his rating matters more than Benny‘s rating

Search-Algorithm, explained with example (2)

- (Copied from previous page):
  - Similarity: Daniel: 75%, Mariya: 50%, Benny: 25%
  - Daniel: {„Nyan Cat“ :★⯪☆☆☆ „Grumpy Cat“ :★★★★⯪ „Simon‘s Cat“ :★★⯪☆☆ }
  - Mariya:{„Nyan Cat“ :★⯪☆☆☆ „Grumpy Cat“ :★⯪☆☆☆ „Simon‘s Cat“ :★★★⯪☆ }
  - Benny: {„Nyan Cat“ :★★★★⯪ „Grumpy Cat“ :★★☆☆☆ „Simon‘s Cat“ :★★⯪☆☆ }
- Scores are calculated, videos sorted by score:
  - „Grumpy Cat“:(★★★★⯪ *75% + ★⯪☆☆☆ *50% + ★★☆☆☆ *25%) / 150% = 2,9
  - „Simon‘s Cat“:(★★⯪☆☆ *75% + ★★★⯪☆ *50% + ★★⯪☆☆ *25%) / 150% = 2,8
  - „Nyan Cat“ : (★⯪☆☆☆ *75% + ★⯪☆☆☆ *50% + ★★★★⯪ *25%) / 150% = 2,0
- „Grumpy Cat“ is the top result, even thought Daniel was the only one who liked it. Because he is most similar to Min!

Summary

- Machine learning is not realistic
- Most suggestions could be used to improve the search results
- We could compare the search-results we get from different attempts
- We could try to merge different attempts for one big search function
  - For example, if similar Users watched a video, we could use this data. But if no similar users watched a video, we could also
- We could compare the algorithms for user-classification and user-similarity to those algorithms big webservices like YouTube are using

Why we skip Machine Learning

1. Feed machine with sample data to learn
    - For example BCI-Data for happy movies and BCI-Data for sad movies
    - The Computer will learn from this sets, maybe also try to find patterns
2. Once the machine is done learning, you can use
    - The machine will try to classify given input
    - In our example, it would try to tell, if a BCI-Data sample is from a happy or sad movie

Problems:

- You need much sample-data to teach the machine.

Why we skip Classifying Users

- Problems:
  - Impossible to evaluate the results
  - Privacy of test-subjects