TEMAT:

The evaluation of the visitors' experiences using technology for the cultural spaces and adjusting the surroundings to be as efficient as possible for the reception. In the near future, development of Human-Museum Interface (both passive and active) will be a milestone for cultural and educational institutions, as they will try to achieve the highest possible level of interaction between the object and the recipient. personalization, preparing cultural spaces for people with disabilities and disorders.

POMYSŁ:

CEL: wybór spersonalizowanej wystawy obrazu dla jednostki i jej osobistych preferencji

- Uczestnik wchodzi w obszar testowy, następuje kalibracja(?), uczenie sieci neuronowej na podstawie reakcji uczestnika na testowe obrazy - np. test obrazów niepokojących różnego typu, obserwowana jest reakcja (w sygnale EEG, EKG, aktywność skóry, eye tracking/EOG) i na tej podstawie ustalany jest obraz, który najlepiej wywołał pożądaną emocję.
- Uczestnik wybiera preferowane doświadczenie (relaksujące, ekscytujące, niepokojące), z bazy wybierane są obrazy otagowane jako podobne do ustalonych jako najefektywniejsze w wywoływaniu określonej emocji u uczestnika w obszarze testowym.
- Podczas wycieczki trasa jest modyfikowana na podstawie oczekiwanego przez uczestnika doświadczenia - dobierane jest oświetlenie, być może również muzyka, dźwięki, które pomogą osiągnąć pożądany stan i samopoczucie uczestnika.

Przykładowy proces:

Ala ---> wybór doświadczenia - straszne ---> obszar testowy - zestaw (np. 10) strasznych obrazów o różnych cechach ---> obraz 2,3 i 8 otrzymały najlepsze wyniki (oczekiwane EEG, EKG, aktywność skóry dla emocji “strach, niepokój”), ich cechy to: ciemny, zęby, krew / przepaść, klif / ciasny, klaustrofobiczny; ---> w obszarze głównym prezentowane są inne obrazy z bazy o tych cechach ---> koniec wycieczki, ocena doświadczenia przez uczestnika;

IDEAS FOR PRESENTATION

- Stimulus people with another -> light, smell, temperature, hearing, vibrations etc.
- Far topic -> how to disableds reacts to our method
- Definitions od emotions https://pl.wikipedia.org/wiki/Paul_Ekman
-

INSPIRATION LINKS

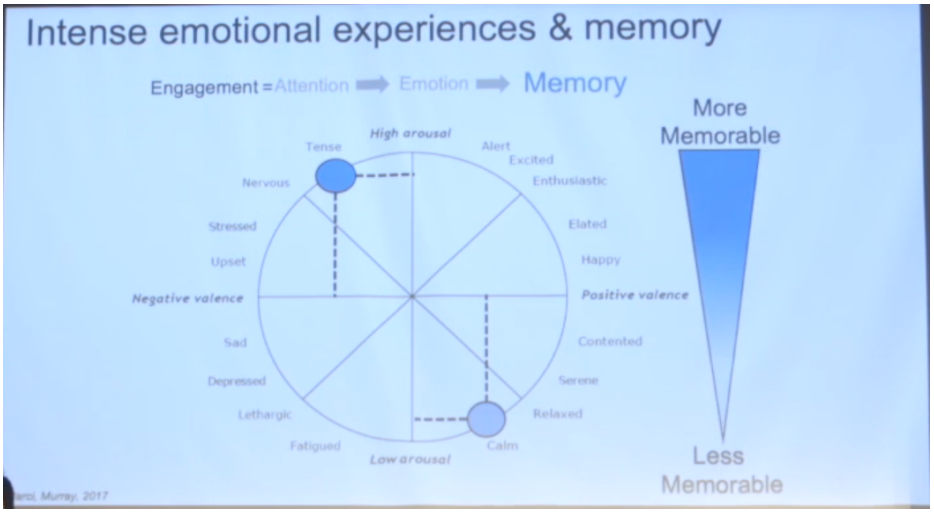
Dataset with ECG and GSR (our main dataset)

https://physionet.org/content/ecg-spider-clip/1.0.0/

- How biofeedback change the stressful reaction
- Process: Subject had to watch 16 1-minute videos with spiders
    - session start with 1-minute clip
    - after spider's session subjects has rest session with biofeedback

Neuroscientist in museum (our main inspiration)

https://www.museumnext.com/article/shaping-museum-stories-with-neuroscience/



- Biosignals to make art exhibition in museum
- 9:12 -> description of plot on the left side
- 9:40 -> description of GSR

Emotions classification from biosignals

https://sci-hub.se/https://link.springer.com/chapter/10.1007/11941354_44

- Method: subjects watch fragments of films with classes (fear, neutral, joy)
- Conclusion: we can predict people emotions with biosignals from theirs bodies with specials classificator
- Important signals
    - EEG
    - HR -> heart rate
    - GSR -> galvanic skin response
    - ST -> skin temperature

Dataset and emotion classifications from physiological signal and annotations data

https://www.nature.com/articles/s41597-019-0209-0#Ack1

- Subjects watched a few films (boring, amusing, relaxing, scary). During films researchers measured physiological signals of subjects and subjects had to describe their emotions with a joystick.
- Physiological data:
    - ECG
    - BVP -> blood volume pulse
    - GSR
    - RSP -> respiration
    - SKT -> skin temperature
    - EMG on zygomaticus major, Corrugator supercilii and Trapezius muscles
- Annotations data:
    - Position of joystick cursor on 2D plane - X axis was valence, and Y axis was arousal

Big meta-analysis about classification of emotion

https://ieeexplore.ieee.org/document/8606087/metrics#metrics

- big meta-analysis from few open source datasets
- A lot of statistical analysis with few methods

- Few signals in one place:
    - EEG
    - ECG
    - GSR
    - RSP
- Important: GSR was filtered with low-pass filter in 0.2 Hz cutoff

Nice equipment to GSR signals

https://www.media.mit.edu/galvactivator/faq.html

- Goal: we need nice equipment that doesn't look scary looking - classical laboratory sets don't look good for non-scientists.
- Instead of two rings on fingers with bracelet with electronics someone made glove like this

Stress in GSR

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3386730/

- Conclusion: GSR can detect different states
- Mean of voltage was higher when subject when subject was under stress
- When voltage is high, skin resistance is small, so conductance is high
    - For stress mean voltage is higher than for relax, so for stress conductance is also higher (resistance is smaller)

PRESENTATION

QUOTES TO USE/REPHRASE:

“However, a recent study conducted by Harris Interactive finds that people are happier when they spend money on experiences rather than material purchases. According to Leaf Van Boven, an Assistant Professor of Psychology at CU-Boulder, experiences are shown to create more happiness than material goods because they provide positive personal reinterpretations over time.”

PRESENTATION:

POINTS:.

1 SLAJD:

Few days ago I listened to music on my Spotify account, and I had a really great morning, so I chose joyful and energetic music. During my happy start of the day a small idea appeared in my head - what if I can choose paintings in an art gallery, or museum fitted to my mood? Our team has an answer for this need... Let us introduce to you MEMaker - Make your museum visit memorable.

2 SLAJD:

For most people, especially young, a museum visit is not a very memorable event. After leaving an exhibition which was supposed to be inspiring we tend to remember only a few masterpieces which drew our attention the most. What if there was a way to enhance this experience?

With our app MEMaker, every visitor will be able to choose the kind of experience they want to have. After you decide what you expect of the visit, a room with the exhibition will be set with your individual preferences in mind. Every work of art will be displayed on a high-resolution screen - that way we can provide the flexibility which is essential for the personalized experience. The whole process is based on a biofeedback method. (40s)

3 SLAJD:

How does it work? Let us introduce you to the process:

Firstly, the viewer goes to the test area - here happens our calibration procedure. The viewer is asked to choose a preferred experience. It may be relaxing, learning, exciting, scary etc. After that, we ask the viewer to put on the ECG collecting bracelet and a special glove to examine the galvanic skin response (later maybe also a comfortable to wear EEG set).

4 SLAJD:

Next, we analyze the response to example pictures from the chosen category. Every picture has a set of features that we have in our database. Based on viewer results we select the set of pictures that will be shown on the main tour.

5 SLAJD:

KNN

In our prototype code we use the K-Nearest Neighbours method to classify the state of the possible visitor from his biosignals. We found the open dataset with people who watch demo clip in the first few minutes, and after this they watch 16 1-minute films with spiders. We classify the demo stage as “not-fear”, and spider stage as “fear”. From the ECG and GSR of the participants we can calculate heart rate from the first signal, and mean from the second

signal - these two variables will create points on the 2-dimensional space. Every point comes from the 2 previous stages, and has class from them. From this dataset we can divide our space to subspaces with KNN - at this point we can classify the state of the visitor (fear or not-fear) from his/her ECG and GSR. Of course in the future we can make better classifiers based on other signals (EEG, temperature, respiratory, EOG...), and other algorithms (neural networks, spectral density, n-dimensional methods…). Also in the future classifiers will be get from experiments on the particular paintings from the museum.

SLAJD 6:

Our goal is to add another senses to the exhibition. Imagine a situation like this - you choose relaxation stimulation, and based on the biomedical classifier you want melancholic landscapes. You approach a small painting of a forest with a wooden lumberjack hut in the morning sunshine. Suddenly lights dim and change to a warm color. You can hear a stream with gentle wind in the background, and air is now colder, and moister. We can manipulate every sense for every painting to make the best possible stimulation.

SLAJD 7:

In addition, we want to make an inspiring adventure for everyone - we will try our best to provide you with the most unusual experience, but we will also take care of your safety and comfort.

Thanks to the fact that all of the pieces of art are displayed on the screen, there will be no problem in viewing for disabled people, because you can, for example, adjust the height of the pictures for everyone.

END SLAJD (8):

Our app, MEMaker, is an app for art galleries or museums which want to make a special tour for every visitor with his personal needs. With new technologies, and signals from our bodies our team can make Spotify for paintings.

Thank you very much.

Q&A:

Q: What do you mean by learning experience?

A: Maybe bci earphones, so the signal is constantly collected; when there is a drop in concentration (disappearance of beta rhythm) - the system provides new art to draw your attention and help you stay focused.

frontend?

- music scent temperature

future development - music and integration with user's spotify

hasło - spotify dla muzeów

special glove: https://www.media.mit.edu/galvactivator/faq.html

BIBLIOGRAFIA

- Song T., Zheng W., Lu C., Zong Y., Zhang X. and Cui Z., "MPED: A Multi-Modal Physiological Emotion Database for Discrete Emotion Recognition," in IEEE Access, vol. 7, pp. 12177-12191, 2019, doi: 10.1109/ACCESS.2019.2891579
- Villarejo MV, Zapirain BG, Zorrilla AM, "A stress sensor based on Galvanic Skin Response (GSR) controlled by ZigBee", in Sensors (Basel), pp. 6075-6101, 2012;12(5), doi:10.3390/s120506075
- Sharma, K., Castellini, C., van den Broek, E.L. et al, "A dataset of continuous affect annotations and physiological signals for emotion analysis", in Sci Data , vol. 6, pp.196, 2019, doi: 10.1038/s41597-019-0209-0
- Li L., Chen J., "Emotion Recognition Using Physiological Signals", in Advances in Artificial Reality and Tele-Existence", vol 4282, ICAT 2006,doi: 10.1007/11941354_44
- Ihmig, F. R., Gogeascoechea, A., Schäfer, S., Lass-Hennemann, J., & Michael, T. "Electrocardiogram, skin conductance and respiration from spider-fearful individuals watching spider video clips", (version 1.0.0), in PhysioNet, 2020, doi: 10.13026/sq6q-zg04.
- Asher T., "Shaping Museum Stories with Neuroscience", Museum Next, 2020, acess may 2021, https://www.museumnext.com/article/shaping-museum-stories-with-neuroscience/
- "Frequently asked questions", access may 2021, https://www.media.mit.edu/galvactivator/faq.html