2SC7990 – What you unwittingly say: decryption and automatic analysis of nonverbal behaviors

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Language of instruction: ANGLAIS
Campus: CAMPUS DE RENNES
Workload (HEE): 80
On-site hours (HPE): 48,00

Description

What you unwittingly say: decryption and automatic analysis of nonverbal behaviors.

Letters, words, sentences: the algorithms we have today are more and more effective in decrypting our grammar, and understanding what we can say. And yet this only covers a tiny part of our communication.

Joy, resignation, irony: only our body and the tone of our voice reveal our deep intentions, our real message, and the automated understanding of such human behaviors and emotions is a big challenge.

To take it up, every year, the audio, video and machine learning communities gather around international challenges of research on the automatic analysis of human behaviors: emotions, depression, mood, motion detection, ... (ex: http://sspnet.eu/avec2017/).

Through this project, you will be able to face one of these challenges. You will have a large dataset representing people in action and will have to automatically determine their behavior and emotions.

Each project team focuses on a particular study (eg the voice, the face, ...), and all teams will gather their work to compare your results to those of the competitors of the international challenge.

Quarter number
ST7

Prerequisites (in terms of CS courses)

Statistics et machine learning.
Signal processing

Computer science :

- Algorithms
- Programming langages (basics)

Syllabus

Background (5%)

- Introduction by the research team.
- Group organization.
- Provision of the challenge data.

State of the art (20%)

- Research and understand research papers on the subject.
- Reproduce a selected subset of state-of-the-art methods (they will serve as a basis for your work).

Pre-processing, understanding and visualization of data (40%)

- Depending on the chosen topic (voice, face, ...), extract the interesting features for your analysis
- Explore the relevant visual representation modes
- Use these representations to guide your analysis strategy

Statistical analysis and learning (20%)

- Choose and build your analysis and learning models
- Quantify your results and compare them to the state of the art

Visibility points and final presentation (15%)

- 3 daily feedback will have to be carried out to present your progress as the project progresses (a different member of the team each time).
- Structure your presentations with the objectives, the state of the art, the architecture diagram, the results tables.
- At the end of the project, present as a team your results to our industrial and academic partners.
- Provide a scientific report

Class components (lecture, labs, etc.)

- Immersion in the FAST research team: supervision by researchers, PhD students and post-docs.
- Organization in teams of 2 to 5 students. If possible, coordination of the different teams for the production of a single overall final result.
- Presentation of the results to our partners.

Grading

Individual daily feedback: 1/4 of the mark
Defense in front of the partners: 1/4 of the mark
Scientific results (system performance): 1/4 of the mark
Scientific report: 1/4 of the mark

Resources

Teaching team:

- Catherine SOLADIE
- Renaud SEGUIER
- Simon LEGLAIVE
- PhD students of AIMAC research team

Software tools and number of licenses needed:

- TensorFlow or equivalent (free)

Learning outcomes covered on the course

At the end of this project, you will be able to:

- Specify or redefine the need (C4.1)
- Navigate among the research papers of a subject, read them and understand them (C2.4)
- Reproduce a selected subset of state-of-the-art methods in signal processing and / or machine learning (C3.2)
- Mix skills from signal processing, statistical analysis and machine learning to analyze data (C2.2)
- Explore visual representation modes that are relevant to your data (C6.3)
- Use these representations to guide your analysis strategy (C3.3)
- Choose and build your analysis and learning models (C1.2, C6.1)
- Quantify your results and compare them to the state of the art (C2.4, C3.3)
- Conduct a large-scale scientific project in a group (C8.1)
- Decrypt a set of non-verbal messages during human interactions (C7.4)
- Argue your scientific approach (C7.1)

Description of the skills acquired at the end of the course

- C2 Jalon 2
    - C2.4 **Données** : Exploiter un ensemble cohérent de données et réaliser un état de l'art exhaustif avec un esprit critique
- C6 Jalon 2
    - C6.3 **Traiter des données** : Mettre en œuvre des algorithmes traitant ou utilisant des données massives (intelligence artificielle, clustering)
- C4 Jalon 2
    - C4.1 **Besoin client** : Identifier avec le client les autres dimensions ne figurant pas dans la formulation initiale : techniques, économiques, humaines, etc.
- C7 Jalon 2
    - C7.1 **Convaincre sur le fond** : Adapter le fond et son argumentation en fonction d'interlocuteurs ou de contextes élargis, « avoir du répondant » pour défendre sa solution (maîtrise du sujet des interlocuteurs, valeurs, engagements, disponibilité, attention, etc.).
- C8 Jalon 2
    - C8.1 **Travailler en équipe** : Associer chaque membre de l'équipe en fonction de ses forces