Optimization of Business Processes thanks to Machine Learning and Virtual Reality

Use-Case: SpeakInVR

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Who am I?

• Education
  • Master in Mathematics:
    • Educational training Master Degree (AESS)
    • Statistics and Actuarial Sciences (Uliège & University of Southampton)
  • Bachelor in Mathematics (Uliège)

• Job
  • PhD candidate in Management Science
  • Teaching Assistant in Mathematics and in Statistics
Research question

How Machine Learning and Virtual Reality can improve Business processes?

- In Marketing: presenting a product
- In Tourism: guided tour
- In HRM: job interview
- In Management: meeting of a manager
Use-case
SpeakInVR : a solution to public speaking

State of the art
• 2D virtual environment
• Reaction of the audience managed by an experimenter in front of the computer interface
• Drawn models

Proposed methods
• 3D virtual environment
• Interactive and autonomous audience
• Use of photorealistic models
Research sub-questions

• Can we automatically identify some behaviours like anxiety thanks to business analytics?
• Can we improve the manager/speaker performances with training in a virtual reality digital twin?
• How to create a useful digital twin for management purposes and when to use?

Interdisciplinary approach

• Business analytics: Statistics, Machine Learning, NLP, Deep Learning
• New digital technologies: AR/VR, IoT, simulation and training in digital twins...
• Applications in behavioural analysis: HRM, Marketing, Psychology, Speech therapy...
3D-environment
SpeakInVR : Digital twin for training
Autonomous and interactive audience

• Highly customizable
• Recorded parameters during the speech (voice, eye tracking, body tracking, ...) for real-time feedbacks
Photorealistic models compared with drawn models
Approach : 3-step process

• Creation of an interactive audience
  Validate the attitudes that an interactive audience should show through a statistical study of about 100 participants (*International AR VR Conference 2020-2021*)

• Voice and Speech analysis with Statistics, NLP, ML and DL approaches
  • Voice indexes
  • Feelings, jokes, ...
  • Word detection
  • ...

• Public speaking training in virtual reality
  Training in front of an interactive audience reacting in an autonomous way (machine learning, deep learning, ...) to the speaker's presentation.
First step: Validation of a virtual audience

- Which attitudes the characters must display and how people perceive the individual members of the audience in terms of their states of arousal and valence.
- Can the use of a 3D photorealistic model significantly improve the user’s presence?
- Can the virtual person's gender or nationality influence the way the public feels about the person in terms of their states of arousal and valence?

Statistical study
About 100 participants

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Challenges/issues of interdisciplinarity

• **New technologies**: the struggle for virtual reality to be taken seriously in the world of Research (not just as hobbies or games)
• **Collaboration**: compulsory in an interdisciplinary setting
• **Communication**: different backgrounds of the researchers
• **Presentation and publication**: difference in standards between disciplines and results that can have multiple applications (ML, NLP, Marketing, Speech therapy, Psychology ...)
Thanks for your attention!