Polytechnic School of Pernambuco
Master in Computing Engineering

Languages of Americas Workshop

May 24-25, 2018

Prof. Alexandre Maciel

amam@ecomp.poli.br

University of Pernambuco - UPE

- Public state university

- Since 1991
  - Isolated schools before

- 12 *campuses* in Pernambuco

- Numbers:
  - 25,509 students
  - 1,283 professors
  - 5,149 employees

- Undergraduate programs:
  - 12 master's degree
  - 6 doctorate degree

Polytechnic School of Pernambuco - POLI

- Founded in 1912
  - Oldest unity of UPE

- Courses:
  - 7 under-graduations
  - 19 specializations
  - 4 master's degree
    - Computer Engineering
    - Systems Engineering
    - Civil Engineering
    - Energy Technology

- Numbers:
  - 3,400 students
  - 150 professors
  - 409 employees

- Pionner in UPE and Brazil

- 17 professors (6 CNPQ Productivity Researchers)

- Research lines:

  – Computational Intelligence and Software Engineering

- Numbers:

  – First M.Sc. Thesis: May, 2008
  – 120 M.Sc. Thesis approved
  – 58 M.Sc. Students currently enrolled

- Main topics researched:

    - Novel metaheuristics for solving real world problems
    - Social Simulation & Stochastic Modeling
    - Pattern recognition & Machine Learning
    - Frameworks, Domain Specific Languages & Tools
    - Requirements and Software Engineering

- Research lines:
  - Pattern Recognition (image and audio)
  - Data mining (educational, marketing)
  - Forecasting (energy, finances, …)

- Numbers:
  - 10 Researchers
  - 18 Ms. Students

- Partnership with industry

Prof. Alexandre Maciel

- Education
  - Ph.D. Computer Science, UFPE (2012)
  - M.S. Computer Science, UFPE (2007)
  - B.S. Computer Science, UNICAP (2003)

- Positions
  - Adjunct Professor of Computing Engineering Course – POLI
  - Member of Master Program in Computing Engineering – POLI
  - Coordinator of Specialization on Data Science and Analytics – POLI
  - Visitor Researcher on State Agency of Information Technology – ATI
  - Member of Innovation Chamber – FACEPE
  - General Coordinator of Innovation – UPE

Prof. Alexandre Maciel

- Research interests:
  - Pattern Recognition
  - Data mining
  - Informatic in Education

- Main award:
  - Science and Innovation Santander 2014

- Research grants and funding:
  - CNPQ Technological researcher
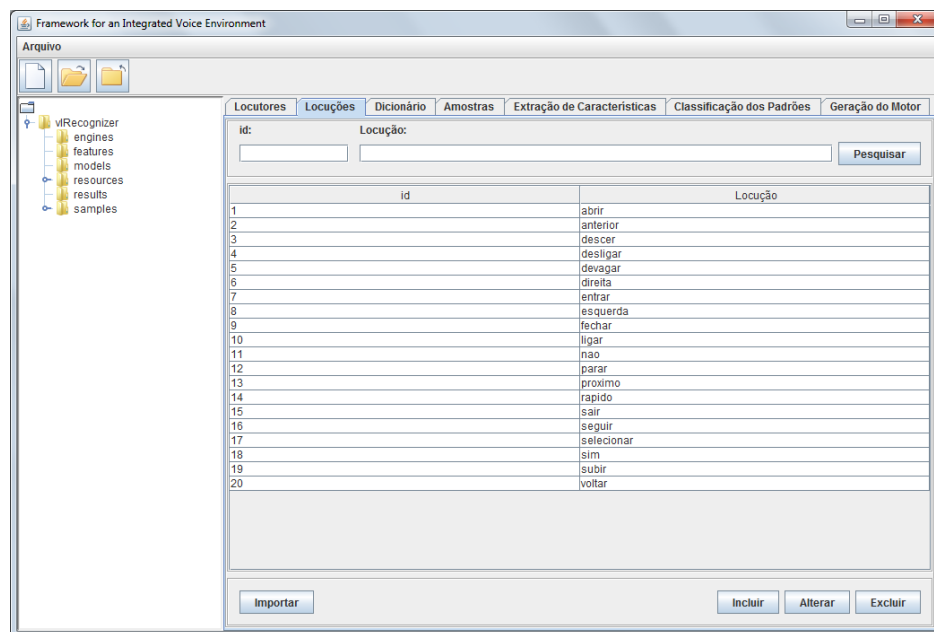 - More than one million Reais in research projects

Project FIVE

- *Framework for an Integrated Voice Environment*

- Engines production:
  - Speech recognition
  - Text-to-Speech
  - Speaker verification

- Extensible and portable:
  - Mobile, Digital TV, IVR

- Software registration on INPI

Language Resources

- **Isolated Words:**
  - 40 speakers (30 male, 10 female)
  - *Age (23.5 years old)*
  - *Location: Brazil notheast*
  - *Controled noise*
  - *20 words:*

  - *Features:*
    - *8kHz*
    - *16 bits*
    - *mono*

Examples:

abrir	anterior	descer	desligar	devagar
direita	entrar	esquerda	fechar	ligar
não	parar	próximo	rápido	sair
seguir	selecionar	sim	subir	voltar

Language Resources

- **Avatar Educação (Cid and Lis):**
  - 2 profissional speakers (1 male, 1 female)
  - *Speech therapy treatment to avoid regionalism*
  - *Studio environment*
  - *800 balanced phonetic phrases:*

  - *Features:*
    - *44kHz*
    - *16 bits*
    - *stereo*

Examples:

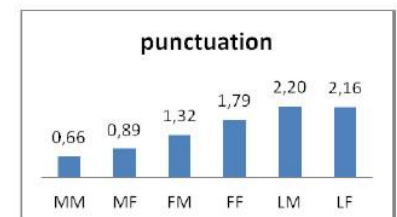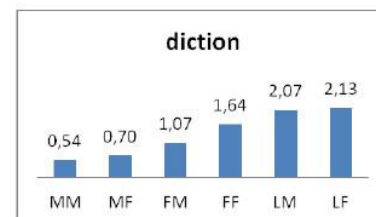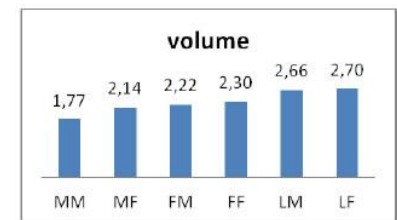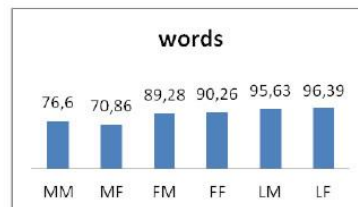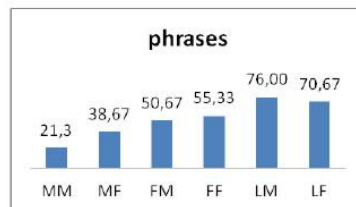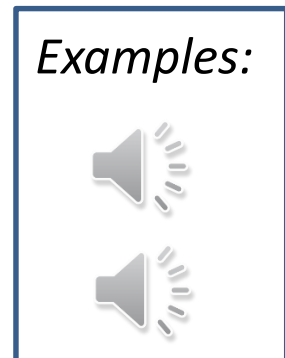| Paradoxalmente, por que não se exige a presença dessa disciplina nos exames do vestibular? |
| --- |
| Por que Brasil e Portugal tem esse estranhamento e essa identificação tão forte? |
| O vizinho Pires de Melo mandou saber se eu queria barganhar a pele da onça . |

INTEGRATION AND EVALUATION OF AN HMM-BASED TEXT-TO-SPEECH SYSTEM TO FIVE

Alexandre Maciel[1,2], Edson Carvalho Filho[1]

Examples:

- *Quality evaluation:*
  - *Mbrola, FIVE and Loquendo*
  - 30 phonetic balanced utterances
  - 30 volunteers
  - *Listen and transcribe*

auditions
2,41 2,36 1,93 2,03 1,49 1,69
MM MF FM FF LM LF

volume
1,77 2,14 2,22 2,30 2,66 2,70
MM MF FM FF LM LF

phrases
21,3 38,67 50,67 55,33 76,00 70,67
MM MF FM FF LM LF

words
76,6 70,86 89,28 90,26 95,63 96,39
MM MF FM FF LM LF

diction
0,54 0,70 1,07 1,64 2,07 2,13
MM MF FM FF LM LF

punctuation
0,66 0,89 1,32 1,79 2,20 2,16
MM MF FM FF LM LF

Development and Integration of Natural Brazilian Portuguese Synthetic Voices to Framework FIVE

Danilo S. Barbosa, Byron L. D. Bezerra, and Alexandre M. A. Maciel

Examples:

- *New Phonetic Database*
  - 140 thousand words in PT-BR
  - *SAMPA* phonetic alphabet
  - New G2P algorithm [Neto]

- Quality Evaluation
  - *HTK, Mary TTS (U and H), Natural*
  - 40 phonetic balanced utterances
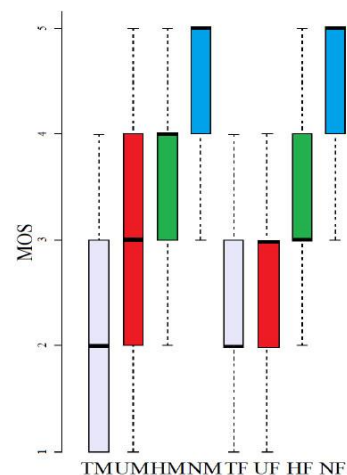 - 100 volunteers
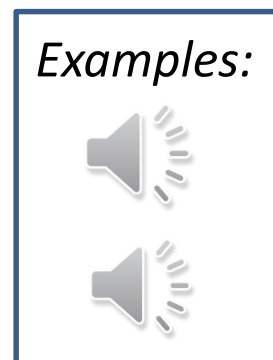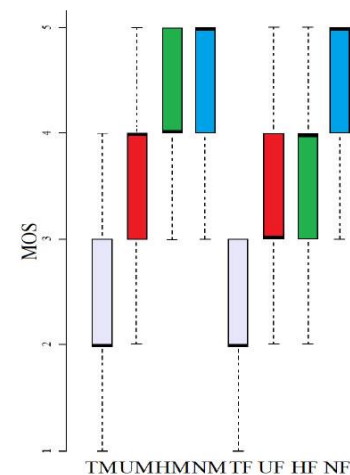 - Naturalness and Intellibility
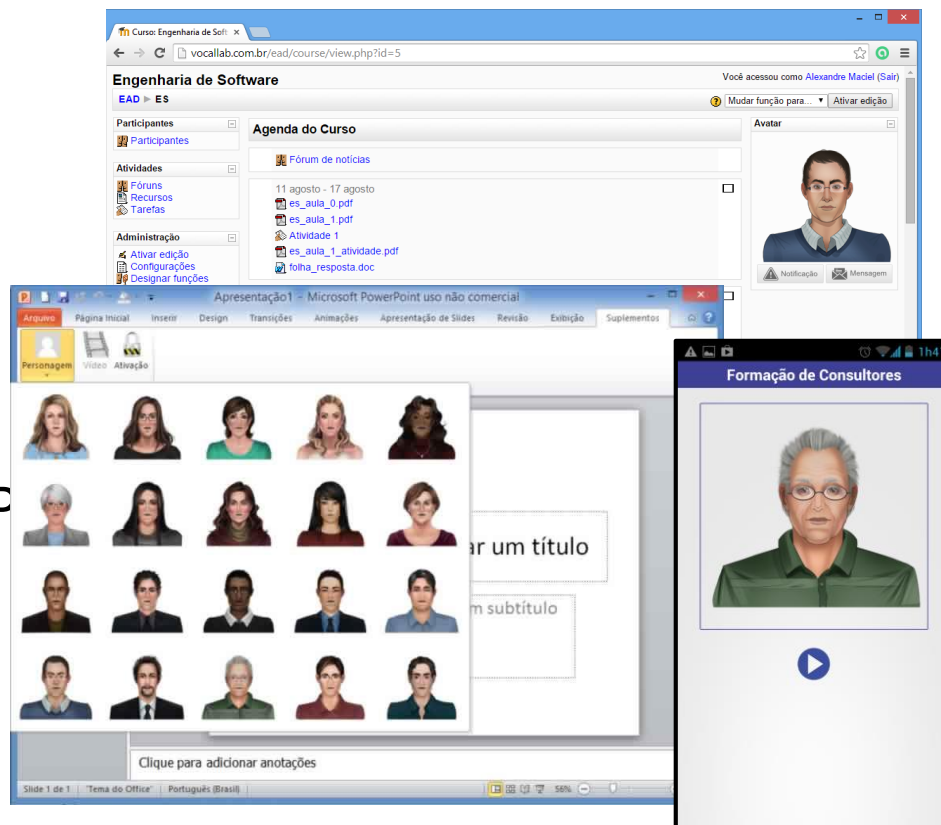

Fig. 4. Results of the naturalness

Fig. 5. Results of the intelligibility

Project Avatar Education

- Animation + Speech Synthesis + Data Mining

- Messages and notifications

- Moodle, PowerPoint
  Android

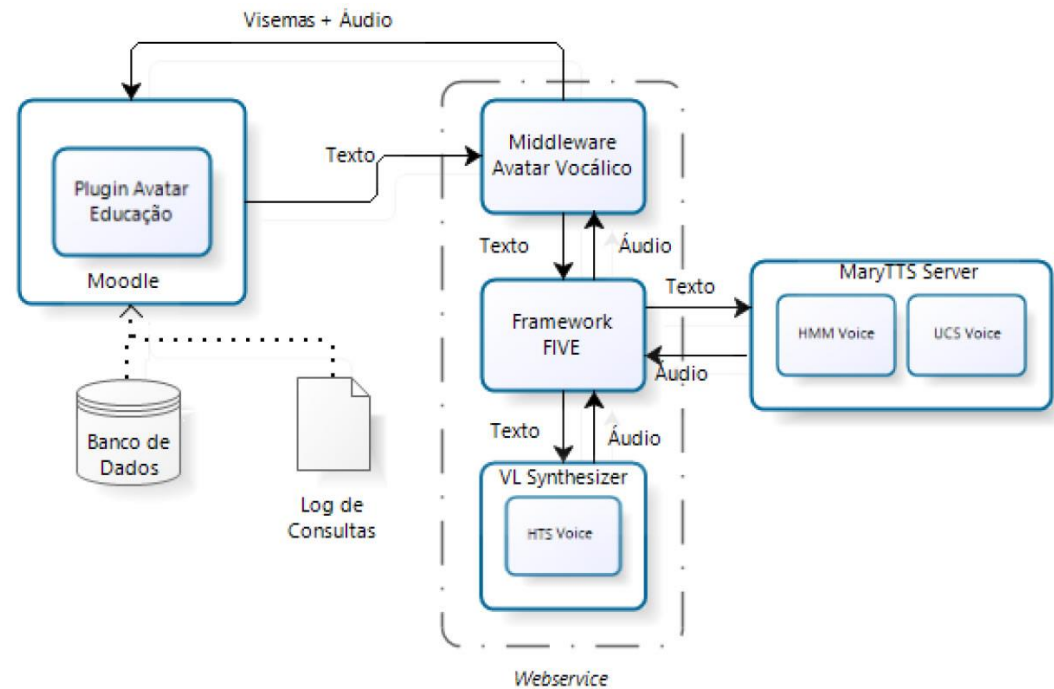- Software registration on INP

Integração do Mecanismo de Síntese de Fala MaryTTS ao Avatar Educação

Fabio Alexandre de Holanda   Danilo de Souza Barbosa   Alexandre Magno Andrade Maciel

- Adjusts on Middleware Avatar Vocálico and Framework FIVE to recognize three types of Engines:
  - HTS Voice
  - Mary TTS
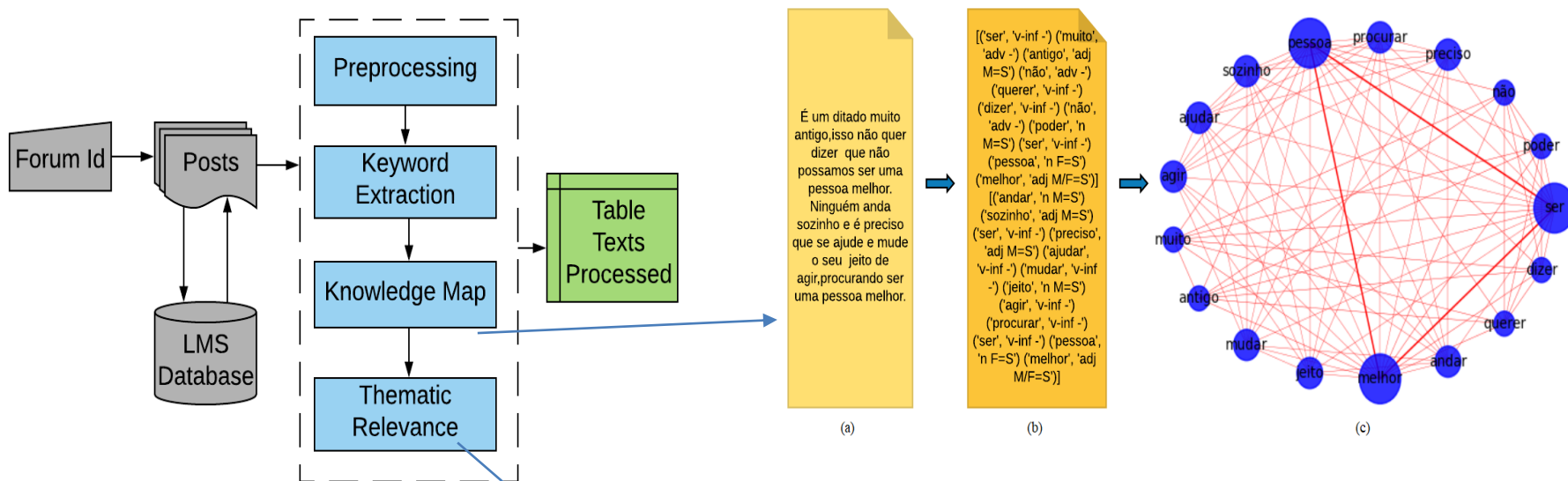   - HM Voice
    - UCS Voice

Language Resources

- **SARA – F123 (private database)**
  - 1 profissional speakers female
  - *6815 balanced phonetic phrases*
    - *Avatar Educação, Laos [Neto] and CETEMPublico*
  - *10 hours and 28 minutes*

  - *Features:*
    - *Wav, MP3 and Flac*
    - *16kHz and 44kHz*
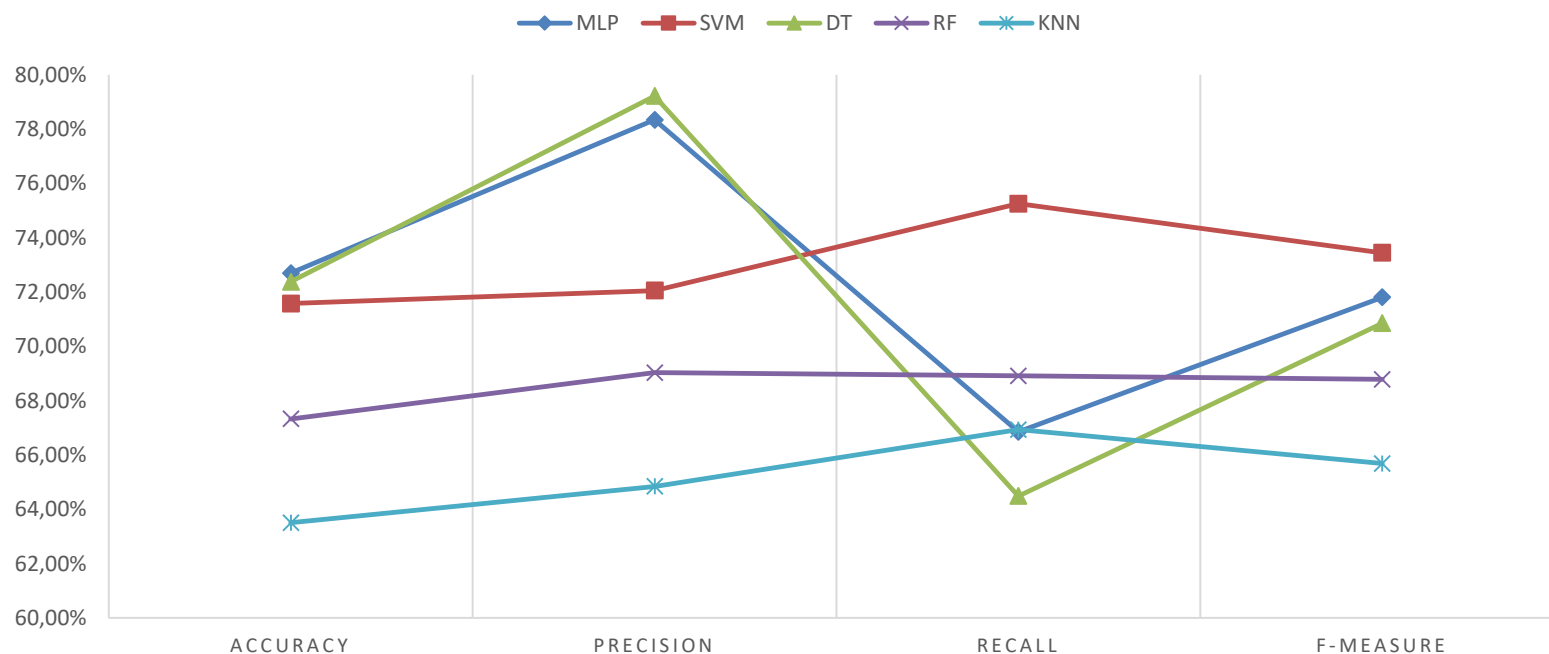   - *32 bits*
    - *mono*

Examples:

An Approach for Thematic Relevance Analysis Applied to Textual Contributions in Discussion Forums

The TRC indicates the degree of relevance of a post according to the topic of the forum…

… equivalences between the nodes and the edges of the formed networks

An Approach for Thematic Relevance Analysis Applied to Textual Contributions in Discussion Forums

A general solution in emotion recognition with speech using semi-supervised learning

Ingryd Pereira[1] and Alexandre Maciel[1]

- **Datasets**:
  - SAVEE
    - 4 male actors in 7 different emotions
    - 480 British English utterances in phone level
  - OMG Emotion
    - 420 Youtube videos in American Engilsh (10 hours)
    - 11635 unique annotations for 7 different emotions + arousal and valence
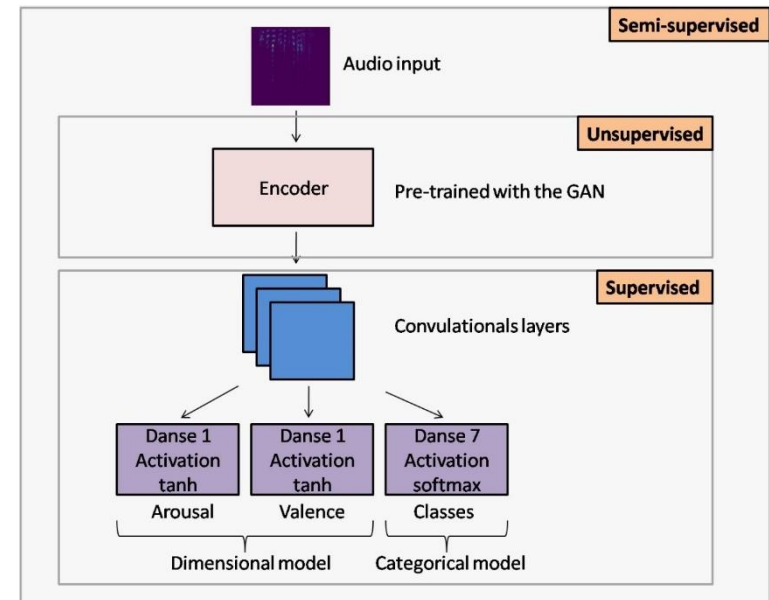 - IEMOCAP
    - 12 hours of audiovisual data, including video, speech, motion capture of face, text transcriptions.
    - 8 different emotions + valence, activation and dominance

A general solution in emotion recognition with speech using semi-supervised learning

Ingryd Pereira[1] and Alexandre Maciel[1]

- Superior or equivalent results compared to state of the art;

- Future works:
  - Building a Portuguese emotional dataset
  - Tests with datasets of others languages

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