**Motivation**
- An emotionally intelligent application can provide more efficient services to the user than conventional applications.
- The user’s emotional state can be detected by intelligent autonomous algorithms.
- Multimodal features can be utilized to achieve better emotion recognition.
- The diverse set of adjectives describing emotions needs standardization for modeling purposes.

**Objectives**
- Develop the ML technique to effectively determine the emotional state of a patient as a measurements based on multimodal data of speech and physiological sensory data.
- Define basic emotional state parameters that can be used as a tuple describing the emotional state.
- Obtain datasets that can be used for train and test functions in the models.
- Evaluate model performance.

**Approach**
- Develop a model that describes emotions with three parameters, thus emotions will be described as vectors in $\mathbb{R}^3$.
- Develop a two-tier regression model:
  - Tier 1: Determine emotions from prosodic features of voice, and determine emotions from heart-rate values measured by wearable sensors.
  - Tier 2: Use an ML model to merge the predictions of the two models of Tier 1.
- Analyze predictive accuracy and emotional dynamism.

**Our Ongoing Work**
Architecture of the experiment to detect stress from prosodic features of voice:
- Ryerson Audio-Visual Database
- OpenSMILE feature toolset
- Orange ML toolbox
- Result: 94.2% accuracy

**Background**
- An Emotionally Intelligent (EI) system has the capability to recognize emotions, approximate they extent appropriately, and use the emotional information to control the response of the system in order to achieve better service. An emotionally intelligent adaptive system has empathy.
- There are over 200 words describing someone’s emotional status. For practical modeling we need a few dominant parameters that catch the main aspects of emotions.
- More accurate emotion detection can be achieved by using information from multiple sources: voice and physiological measurements.

Future work: Although everyone can have the same emotions, the dynamism how emotions change depend on personality. Dynamism of emotions will be our next subject of research.

**Design**

**Architecture of the Emotionally Intelligent, Closed-Loop Digital Patient Assistant system:**

**References**