

DESIGN, DEVELOPMENT AND VALIDATION OF A MOBILE APPLICATION FOR EARLY DETECTION OF COGNITIVE IMPAIRMENT BY GAIT ANALYSIS

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Motivation

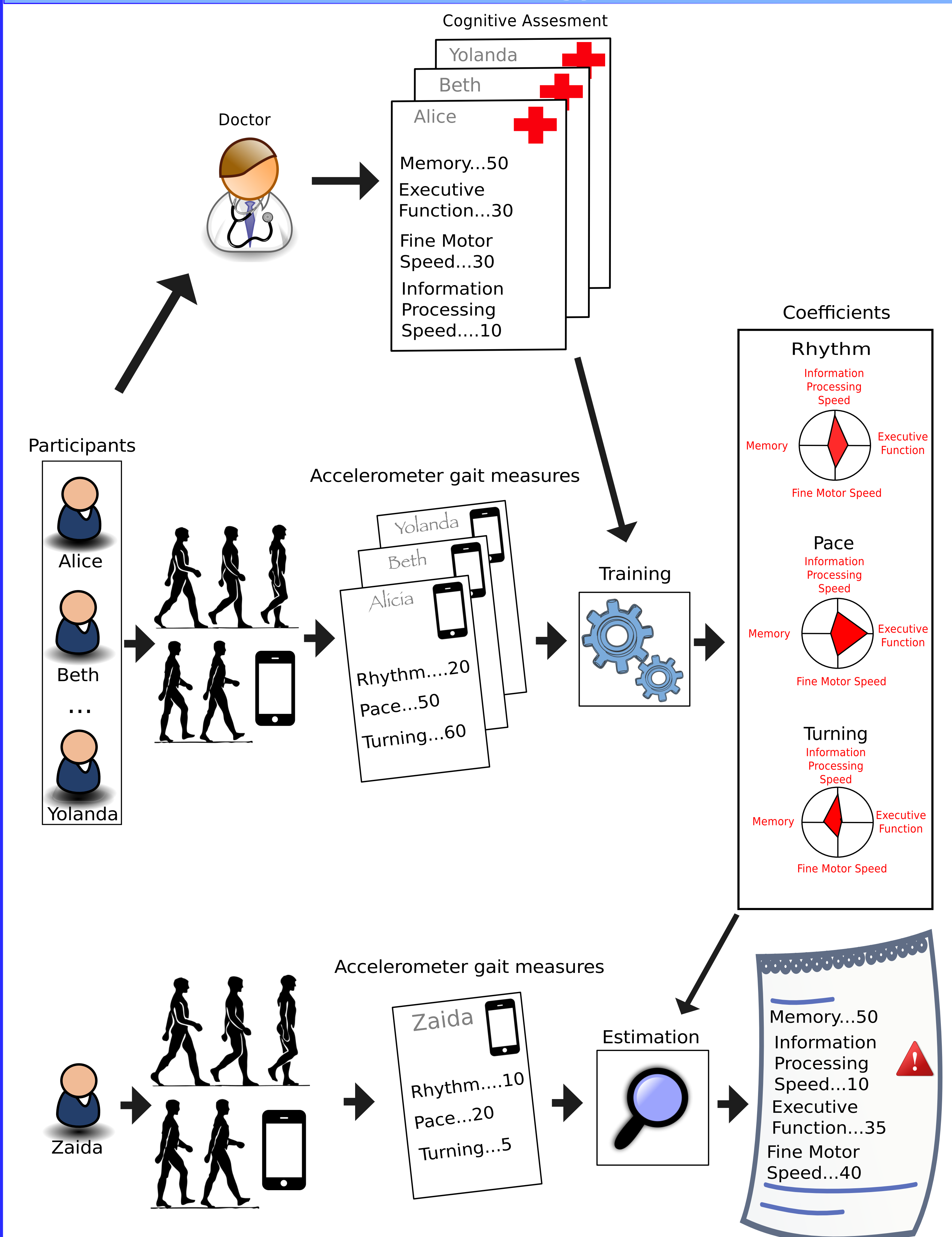
- Ageing of the population:
 - Increase the number of people affected by cognitive impairments.
- Detected a posteriori:
 - Delay in detection. [1]
 - Loss of responsiveness and treatment. [1]
- Innovative techniques: Avaliation of motor skills:
 - Affected in the preclinical stages of the disease.
 - Gait [2,3]
- Several works about the relatedness among gait features and CI:
 - Balance and Alzheimer [4]
 - Speed and memory and executive function [5]
 - etc.
- Now: Detection through intrusive techniques (e.g. tests)
 - Rejection in patients.
- Need: Non-intrusive detection of cognitive impairments:
 - Gait: Promising mechanism for early diagnosis of diseases related to cognitive impairment.
- Techniques for obtaining Gait features:
 - Electronic carpets, accelerometer, force platforms, etc. [6,7,8,9]
- Hypothesis: Gait is an indicator of the onset of a CI.
 - To develop a non-intrusive mechanism to relate gait features and CI:
 - Smartphone / Smartwatch accelerometers.
 - Machine learning [7, 11]

Objectives

- Main objective:
 - To design, develop and validate an screening application to detect CI through the gait analysis of a person.
 - Non-intrusively.
 - Smartphone / Smartwatch accelerometers.
 - Machine learning.
- Specific objectives:
 - Review of the state of the art:
 - Gait and CI relatedness.
 - Machine learning techniques and algorithms.
 - Identification and study of the most suitable devices.
 - Selection / design of machine learning algorithms.
 - Design and implementation of the mobile application.
 - System validation through pilots.
 - Identification and implementation of possible improvements.
 - Dissemination of results.

Research Plan

Methodology



Approach followed in the proposal for inferring the cognitive status of a person by using the gait captured through an electronic device.

Technical resources



Next Year Planning

Activity	2015						2016					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Select conventional tests												
Select gait features to capture												
Develop mobile application												
Requirements analysis												
Design												
Implementation												
Test												

References

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[6] Vincentius J A Verlinden et al. Cognition and gait show a distinct pattern of association in the general population. Alzheimer's and Dementia, 10:328335, 2014.

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[9] Shu Nishiguchi et al. Reliability and Validity of Gait Analysis by Android-Based Smartphone, 2012.

[10] Pogorelc, Bogdan et al. Automatic recognition of gait-related health problems in the elderly using machine learning. Multimedia Tools and Applications, 58:333354, 2012.