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CONCEPTUAL MODEL OF THE APPLICATION OF THE ABA METHOD IN ALZHEIMER'S TREATMENT SUPPORTED BY DATA SCIENCE

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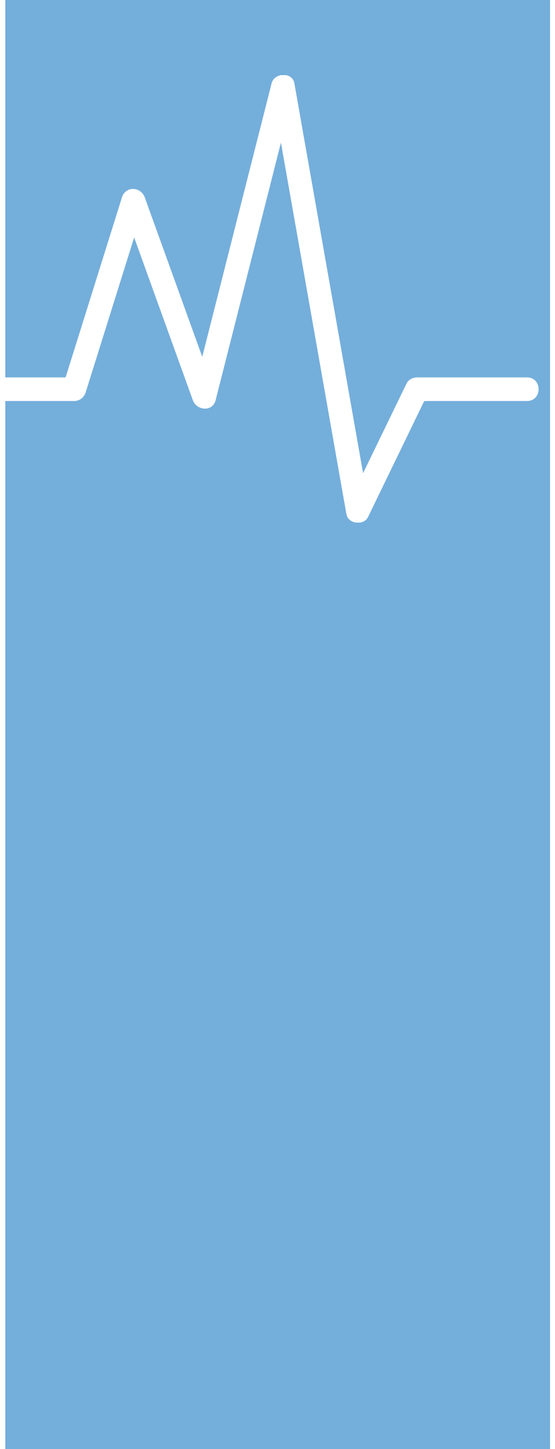
Curriculum

Graduated in Psychology from the Methodist University of São Paulo (2005). Specialist in Behavioral Assessment Process in Applied Behavior Analysis in the Treatment of People with Autism Spectrum Disorder. Specialist in Cognitive Behavioral Therapy. He has solid and extensive experience in the treatment of people with mental disorders and disabilities. Founder and Director of Religare Rehabilitation Center. Founder and responsible for the Conecta Project, being the treatment base for all Religare clinical units. Creator and director of the Center for Research, Development and Innovation in the area of syndromes, disorders and mental health, the Religare Innovation Lab, located in the Technology and Innovation Ecosystem in the city of Marília/SP - Brazil.

Priscila Parede

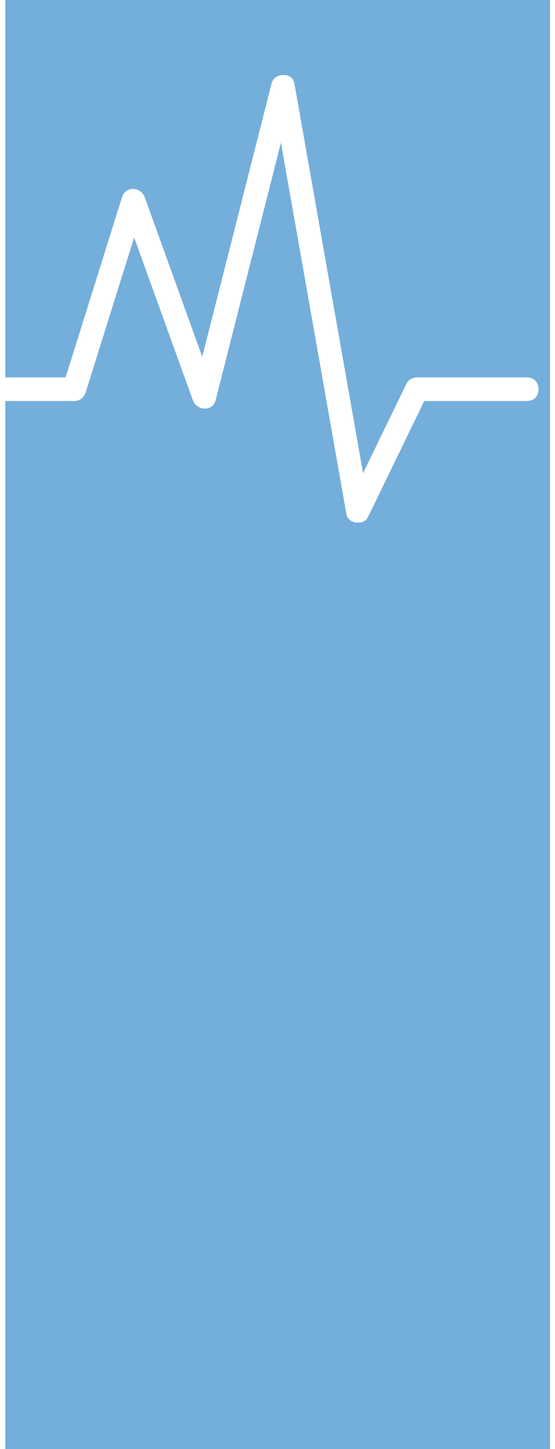
Introduction



Alzheimer's Disease (AD) is characterized as a neurodegenerative disorder that causes gradually progressive cognitive and functional deficits and behavioral changes. Checking for symptoms of cognitive loss and memory loss, behavioral symptoms, functional decline, and cognitive testing remain the cornerstone of clinical diagnosis and treatment of AD patients.

Current studies are converging in stating that the verification of symptoms of cognitive loss, the identification of behavioral symptoms and functional decline and the performance of cognitive tests remain as the basis of the clinical diagnosis and treatment of patients with AD.

Introduction



Individuals with Autism Spectrum Disorder (ASD) or with AD have specific deficits in their ability to learn procedural skills that are explained by the loss of their motor coordination.

Thus, we can say that an interdisciplinary team that works with the Applied Behavior Analysis (ABA) method will be able to offer specific stimuli to patients with AD, as is already the case with individuals with ASD, whether they are professionals in Psychology, Speech Therapy, Psychomotricity, Physiotherapy, among others.

Study objectives

The general objective of this study is to analyze the potential of the ABA method in the treatment of Alzheimer's Disease with the support of an informational platform based on Data Science (DS) techniques. Specifically, we intend to:

a) study the feasibility and effectiveness of the ABA method in patients diagnosed with Alzheimer's Disease, with a view to expanding quality of life and promoting cognitive, speech-language and psychomotor advances and

b) developing a prototype composed of a digital platform using data analysis techniques and algorithms linked to the application of the ABA method to support the treatment of AD patients as a proof of concept of the proposal's feasibility.

Methodology

Considering that this is a feasibility study, we started with the Systematic Literature Review (SLR) in search of information about the scope of the study, in order to synthesize the production of knowledge about Alzheimer's Disease, the application of the ABA method, the use of Data Science in the health area and, in particular, in the treatment of AD.

By retrieving the results of the research already carried out on these subjects, we find:

Methodology

- ·Case studies and applications of the ABA method, to establish possible relationships between its application in patients with ASD and patients diagnosed with AD in terms of cognitive gains;

- ·Case studies and applications of tests and scales in patients with AD in the areas of Psychology, Speech Therapy, Physiotherapy and Psychomotricity, to establish possible relationships between their application, cognitive gains and improvement in quality of life;

Methodology

- Case studies, techniques, applications and DS models applied in learning and improving the treatment of AD based on massive environments of data generated by the treatment and the tests mentioned in the previous activities;

- ·Case studies and identification of methodologies and technologies for modeling, merging, mining, management and data analysis, applied to the representation and processing in digital informational environments of data analysis systems, based on information from the capture of AD treatment with the application of the ABA method.

Methodology

The MCE is composed of patients from the Religare Clinic – Rehab Center. The Religare Clinic is located in the city of Santo André, metropolitan region of the State of São Paulo, Brazil.

Diagnosed with mild or moderate AD, identified and chosen intentionally, for Alzheimer's Disease submitted to the ABA method, patients will be submitted to the application of tests and scales in the areas of Physiotherapy, Psychomotricity, Psychology and Speech Therapy, to assess their cognitive performance and improvements in quality of life and to validate the ABA method in the treatment of these patients.

Methodology

The use of disruptive computing technologies using Data Science resources will expand the possibilities of treatment through the digitization and automation of processes that increase the ability to exponentiate the analysis of results.

It is proposed to use massive data analysis techniques generated from the diagnosis history, application of the ABA method and tests in related areas to support treatment evaluation plans and improvements in the adequacy of the ABA method in the treatment of AD.

Figure 1 presents the conceptual model of the proposal that results in the development of the prototype that will be validated through a proof of concept of the presented methodology:

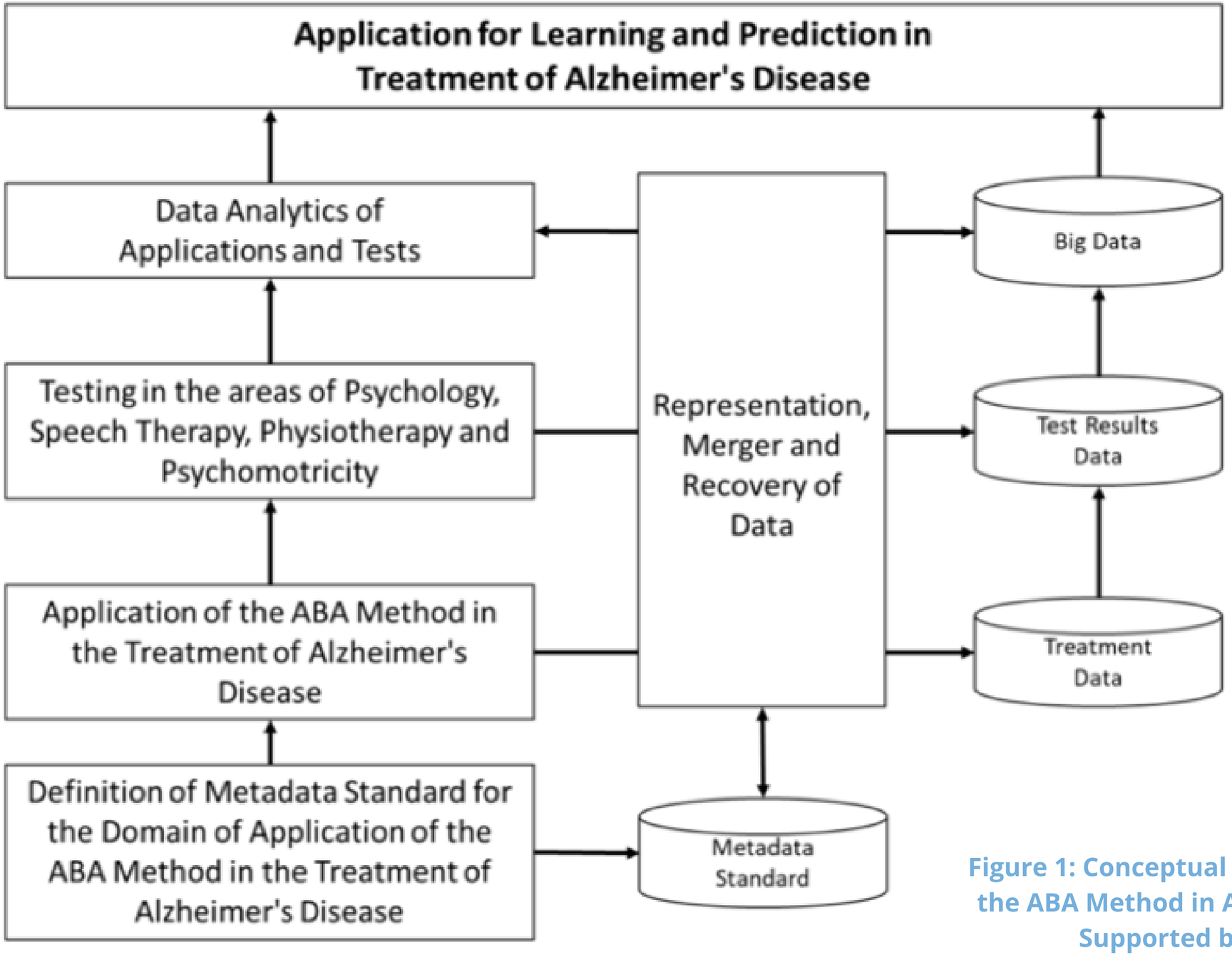


Figure 1: Conceptual Model of Application of the ABA Method in Alzheimer's Treatment Supported by Data Science

Methodology

The main purpose of the conceptual model is to capture information requirements from a research point of view. As an important instrument used to represent the prototype to be developed, the construction of a Conceptual Model should not be limited only to the need to represent the prototype, but rather to develop global views of the entire research process.

This can be seen in Table I that specifies the components that represents the Conceptual Model:

Category	Component	Especification
Data Layer	Metadata Standard	Standardized data scheme of informational elements describing the characteristics of AD and treatment methods.
Data Layer	Treatment Data	Data extracted from the treatment of AD.
Data Layer	Test Result Data	Results obtained through tests applied after treatment
Data Layer	Big Data	Database formed by several information sources obtained from diagnosis, treatment and tests.
Process Layer	Definition of Metadata Standard	Specification of the conceptual data schema of the proposed model.
Process Layer	Application	Treatment of patients with AD using the ABA Method.
Process Layer	Testing	Application of tests in patients treated with the ABA Method.

Table I. Conceptual Model Components

Results

To support the digital informational application to be developed to validate this proposal, a metadata standard is defined that simplifies and standardizes the data that will be generated in the application phases of the ABA method in the treatment of AD and in the application of the tests. From this metadata standard, a database with Big Data characteristics will be built from the generation of data in each subsequent phase, until the moment of analysis of the generated data and transformation into information for the application of learning and prediction that improve the AD treatment process.

It is expected that with the implementation of this model, there will be an improvement in the treatment of AD through the application of the ABA method supported by indicators and knowledge generated by applications in the area of Data Science based on Big Data environments.

Conclusion

The partial results indicate that the technological structure applied in the AD treatment process will allow innovation in the treatment methodology through the ABA method applied in AD and innovation in the use of disruptive computational technologies in the process of evaluation, testing and learning of AD treatment.

The feasibility study of the techniques and activities of the ABA method to be adopted in the treatment of patients with AD is under development and a protocol for the application of tests and scales in the areas of Psychology, Speech Therapy, Psychomotricity and Physiotherapy able to validate the ABA method in the treatment of patients with AD.

Conclusion

In the end, it is expected to develop a prototype of DS application based on the information generated by the tests for learning and predicting the treatment of AD with ABA method resources, to subsidize the proof of concept that supports this proposal.

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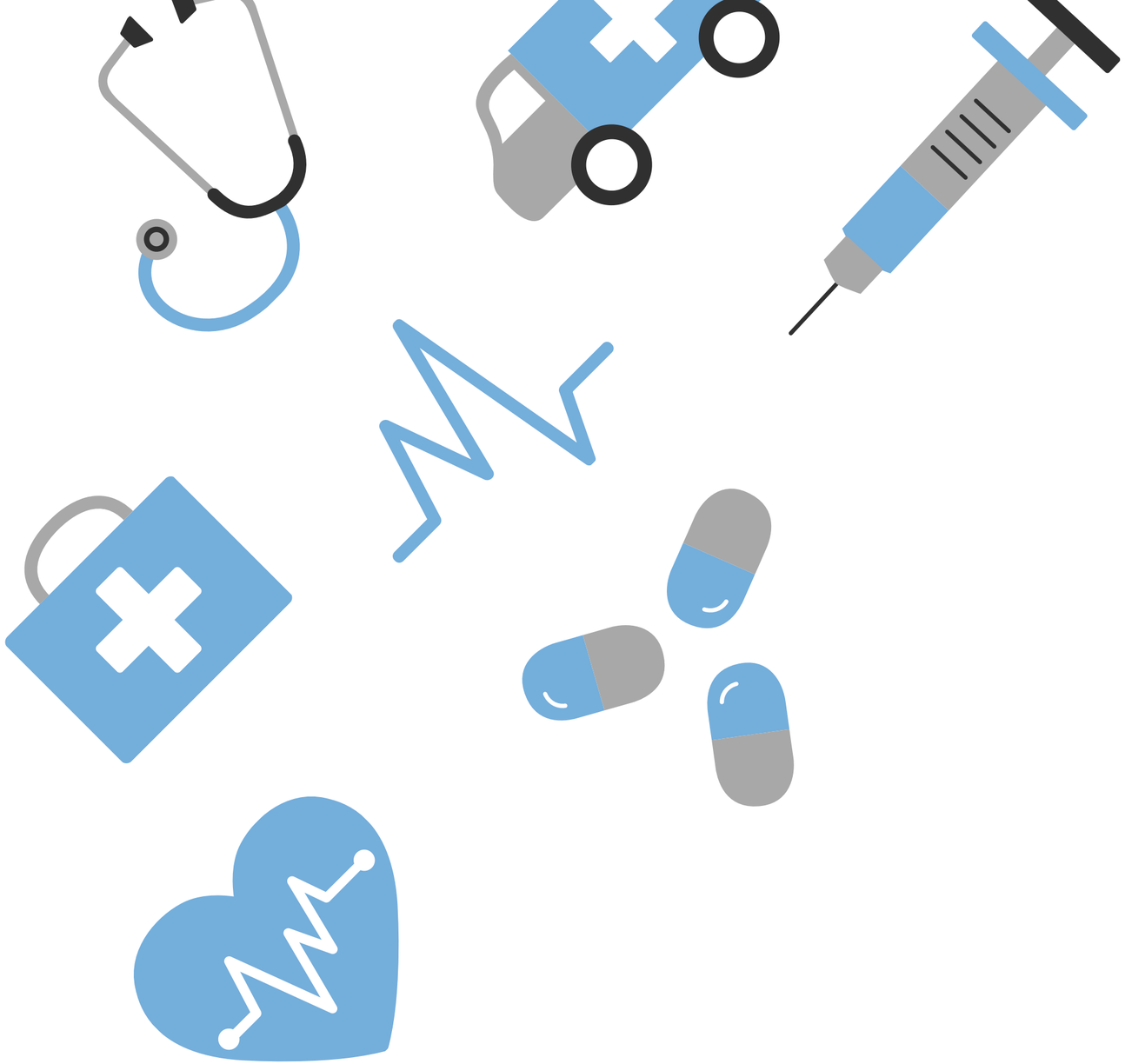

For your attention, thank you

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