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Experimental Framework for the Categorization of Special Education Programs of ASKNAO

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Abstract

This paper presents the methods for categorizing a special education apps known as Autism Solution for Kids using NAO (ASKNAO) into the three subscales of autism which is Communication, Social Skills and Repetitive Behavior. The ASKNAO programs contains special education apps that is aimed for autism rehabilitation. As the apps have yet to be categorized, an experimental framework is proposed as to create a method of organizing the apps. With the usage of a 24 behavioral score sheet based on GARS-2, the reactions of the autistic children when interacting with the NAO robot during the experimental sessions can help classify the apps accordingly. There is however a few criteria needs to be met for the experimental data can be considered as reliable.

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Keywords: humanoid robot NAO; autism; ASKNAO; rehabilitation robotics; special education apps categorization

Nomenclature

n	= sample size
X^2	= Chi – squared for the specified confidence level at 1 degree of freedom
N	= Population size
P	= Population proportion (.50 in this table)
ME	= desired Margin of Error

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1. Introduction

Researching in the field of autism is quite common to do as the disease itself has been around for many years. The topic of research would usually surround towards the idea of trying to cure the disease itself. Although autism has been around for a long time, the cure and the exact cause for the disease continues to elude researchers. Backed with the fact that autism prevalence continue rising each year, there is a dire need to treat the patients effectively as the cost to facilitate them are growing annually. Furthermore, the patients whom had no treatment would grow to be dependent of others, unable to contribute towards their society and community and ultimately could prove to be a burden to their government and country.

Aldebaran Robotics of France had launch a program known as Autism Solution for Kids using Nao (ASKNAO) as a method to help treat the children with autism. The ASKNAO program is to be used in conjuncture with the humanoid Nao robot and the program itself are easy to be used by therapist, researchers and parents alike. Having a total of 50 modules, the apps can help to teach the children with autism basic elementary subjects while at the same time train them to learn on the social and communication skills that they had lack. The modules however have yet to be classified into the 'triads of impairment' so that parents and therapist could easily train their child with the specific skills that they desire.

1.1. Autism

Autism is a neurodevelopmental disorder in which it affects a person behaviour throughout his/her entire life. It is characterized by three main behaviour in which a person is impaired in social interaction, impairment in communication either verbal or nonverbal and having restrictive and repetitive behavior [1]. A person however doesn't necessarily need to have all the three characteristic to be diagnosed with autism as autism is a collective range of disorder. Therefore, any types of disorder that fall in place having the same characteristics can also be classified as autism such as Asperger syndrome. With statistics had shown that autism is on the rise [2][3][4], researchers and therapist alike are trying to find a more suitable way to help the people diagnosed with autism . This is done to ensure that the autistic person is able to fully live independently without the need of constant supervision. Both researcher and therapist would suggest to intervene with autism during their childhood [5] as a child is more prone to learning and absorbing information than their adult counterpart [6].

Autism therapy is continued to be developed from time to time. Back in 1976 when autism was still considered as a type of schizophrenia [7], the treatment applied would range from chelation treatment [8], electroconvulsive therapy [9], and electro shocking for punishing undesired behaviour [10]. Nowadays, the treatment are mostly done in the form of therapy. Medications supplied towards the patients are rarely for autism itself but rather to treat other diseases that comes together with autism such as depression, anxiety, hyperactivity and obsessive-compulsive disorder [11]. The most common used therapy for autism is the Applied Behaviour Analysis (ABA) [12] in which the patients are given rewards when exhibits the correct behaviour as to encourage them to do more of it. The applications within the ASKNAO program are mostly based on the ABA therapy as the application mostly would require the child to give the correct answer. Then the NAO robot would congratulate the child when answered correctly and would encourage the child to try again when answered incorrectly. To further strengthen the praise for the child's correct behaviour, the NAO robot can also be instructed to dance to entertain the child.

1.2. Applications of technology in therapy

As autism is already having a long history in medical journals [13], their treatment had gradually changed following their respective era [14], as researcher and therapist are perfecting the method for curing autism. Nowadays, living and surrounded by various technology, researchers are opting to using technology in autism intervention [15] as they see that current technology has a lot to offer in the medical field [16][17][18]. This is perhaps due to the nature of technology itself in which it can easily be used repetitively and the fact that both therapist and researcher found that technology attracts the autistic's attention [19]. With this in mind, more and more researchers are publishing their findings of using technology in autism intervention. Some would adapt video