CARES: an Inclusive Personalized Touristic System for Autism

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ABSTRACT

People have different interests and cognitive capabilities that should be taken into account when developing technological support for cultural heritage exploration. In this project, we aim to help people with autism to plan a tourist trip by taking into account their interests and their cognitive skills. We plan to personalize the suggestion of touristic places and itineraries taking into account different types of constraints such as temporal and physical ones. Moreover, we aim to adapt the user interface of the system on the basis of the users' capabilities to deliver the right information, using a proper visualization modality, avoiding information overload. In this way, people will be able to know in advance the plan for the trip and this would reduce their level of stress and anxiety. In this paper, we focus on the first stage of the project, i.e. the qualitative interviews we carried out together with the user requirements for our application.

CCS CONCEPTS

• **Information systems** → *Web searching and information discovery*; *Recommender systems*; • **Human-centered computing** → *Interaction techniques*.

KEYWORDS

Autism, Accessible Tourism, Mobile Guide

1 INTRODUCTION

Recently, the travel experiences of people with special needs have started to receive some attention from research in the tourism field [3, 6, 7] because about 26% (1 out of 4) of the population in the US, and 15% worldwide, show some kind of disability.

Many technological tools have been developed to support people with physical disabilities (such as motor disabilities) and sensory disabilities (such as blindness and deafness), but not many for cognitive disabilities. Similarly, previous research has overlooked neurodiversity, even though the number of autistic people is constantly increasing. In less than twenty years, the number of certified cases of Autism Spectrum Disorder (ASD) has raised from 0.3% to 1.5%[1]. According to the Centers for Disease Control and Prevention (CDC), about 1% of the world's population has Autism Spectrum Disorder (ASD). In the US, about 1 in 44 children has autism according to CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network [15]. ASD is reported to occur in all racial, ethnic, and socioeconomic groups. It is one of the neurodevelopmental disorders that require special attention in the tourism field because of its specific nature and of the existing societal stereotypes towards people with ASD. Travel experiences of these people can be very different from those of people with other disabilities, such as physical ones. A comprehensive framework describing the travel experiences of autistic people is missing [1]. Similarly, to the best of our knowledge, no previous research addresses the domain of cognitive impairments and diversities to favor touristic exploration considering the individual needs and the specificity of people with autism.

People with autism have a reduced range of activities because they tend to have rigid routines [22]. Moreover, autism entails an atypical sensory perception (e.g., in smell, hearing, and sight) in over 90% of individuals [26]. People with autism may be overloaded by environmental stimuli that do not usually cause any problems to neurotypical people [18, 19]. This hyper-reactivity to sensory

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[1]https://www.cdc.gov/ncbddd/autism/data.html

stimuli is crucial for the exploration of places, and it may negatively influence everyday movements. Because of these characteristics, people with ASD actively avoid places that may negatively overstimulate their senses [25]. Thus, they need support when exploring a new place to minimize their level of stress.

The main goal of CARES (inClusive personAlized touRistic systEm for autiSm) is to allow adults with autism spectrum disorders to live a serene and pleasant tourist experience, improving their quality of life, and helping caregivers and family members to manage and enjoy the journey together. In particular, we aim to develop an accessible digital guide that can help people with autism in the tourist exploration of places that are new to them, trying to minimize their level of stress.

The CARES project is funded by Fondazione CRT and involves a collaboration between the Computer Science Department of the University of Torino and the Adult Autism Center of Torino, Italy. As a use case, we will use the Langhe area in the North-West of Italy, since the people involved in the experiment will be patients of the Regional Expert Center for Adult Autism located in Torino which organizes some tourist trips over there.

The remainder of this paper is organized as follows: Section 2 provides background about the role of tourism for people with ASD and the available technological support. Section 3 describes the qualitative interviews we carried out to gather the user requirements for our application. Section 4 presents our proposal for an inclusive guide and Section 5 discusses the next steps and concludes the paper.

2 TOURISM AND AUTISM

In this section, we provide background about the role of tourism for people with disabilities, with a special focus on autism spectrum disorder, and on the available technological support.

The motivations to travel for people with some kind of disability have been explored by some studies [3, 6, 9, 20, 24], but they mainly focus on visual and hearing impairments and mobility disorders. However, as seen, the needs of people with ASD could be very different from those of people having other disabilities.

Autism should not be even defined as a disability because it is a neurodiversity that affects how people perceive the world and interact with others. Autism is a spectrum condition, i.e., it affects individuals in different ways. People with ASD can have learning and cognitive issues or full intellectual capabilities. However, they have in common an atypical social functioning, which can lead to isolation [13], and atypical sensory perception, which means that they react differently to sensory stimulation [21, 27]. This affects the tourist and traveling experience of ASD people since it implies their exposure to unpredictable environmental stimuli. As a consequence, they are less likely to explore new environments [25], since they prefer deterministic situations and rigid routines, while being afraid of any novel situation [22].

Given the unique characteristics of people with ASD, it is necessary to offer them tools that provide support and may enable pleasurable travel experiences. The current conceptualization of motivations for travel in the tourism field may not effectively reflect the motivations of people with ASD. For example, [17] categorizes major travel motivators as novelty, escape/relaxation, relationship enhancement, and self-development, and no one seems to fit people with ASD. For instance, in their case, novelty can be considered a disadvantage, because they are negatively affected by the lack of routines and the unpredictable sensory issues that may arise while traveling [11].

Since people with ASD show a positive attitude towards computer technologies, ICT has been largely used as a support. Usually, ICT-based solutions focus on communication [4] and emotional issues [22], especially for children [10]. Until now not many ICT tools have been developed to favor the tourist experience of people with autism. There are some information websites like AutisticGlobetrotting [8] and Toerisme voor Autisme[2], and some Virtual Reality-based tools for training specific skills needed to travel [2, 14, 23]. We did not find any mobile guide specifically designed for people with autism with similar features as the ones we propose.

3 USERS' TRAVEL NEEDS AND REQUIREMENTS: QUALITATIVE INTERVIEWS

One of the main goals of the CARES project is to improve the traveling experience of people with autism. To reach this goal, and to gather requirements for our digital guide, we interviewed 17 autistic people through a set of qualitative interviews.

Participants. The participants were recruited by the staff of the Adult Autism Department of Mental Health, ASL City of Torino, Italy. We interviewed 13 people (females: 6, males: 7, non-binary: 0) with ASD level 1 (High-Functioning, HF) and 4 people with ASD level 2 (Mid-Functioning, MF). They live in the city of Torino and its surroundings and, unlike MF, not everyone lives with their families.

Questions. The interviews were semi-structured and were carried out by a clinical psychologist specializing in autism. Each interview took about 1 hour and has been coded by the researchers.

Responses. Interview responses showed that all participants like traveling, although there are some critical issues. They prefer to travel with friends, family, or, in a few cases, with partners. It is important to notice that no one wants to travel with unknown or semi-unknown people because it might be psychologically distressing. Regarding the means of transport, participants answered by following the reasoning: it depends on where you need to go. Thus, for international travel, they use the plane (except for those who are afraid to take it or those who, by environmental issues, do not want to take it). For national travel, they use either the bus, car, or train. The main difficulty is the travel planning phase: the interviewees feel stressed when they have to plan the trip (where to go, how to go, where to sleep, etc.). For this reason, they tend to delegate to someone else, give up the organization of the trip (especially HF people), or, sometimes, the family organizes the trip for them (especially MF people). For the interviewees, it is essential to know in advance the characteristics of the places they are going to visit, where they are going to stay for the night, and where they are going to eat. Concerning sensory peculiarities, participants pointed out that the place should be adaptable to their sensorial needs (avoid annoying noises, unpleasant smells, and overly crowded places).

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[2]https://www.toerismevoorautisme.be/

Furthermore, the trip duration is also relevant. Most participants would prefer to make short trips because long journeys could be tiring. Finally, to make the experience more pleasant, participants often choose destinations based on their preferences and interests (e.g. going to Liverpool because they like the Beatles).

4 AN INCLUSIVE TOURIST GUIDE

According to the interviews' answers and state-of-art studies, we can say that the main traveling issues were: fear of novelty, hyper-sensibility to sensory stimulation, perceptual overload, and need for control. Thus, we need to find a way to address these issues:

- Fear of novelty [13]: suggesting only things to do that are somehow similar to what the people already know and like.
- Hyper-sensibility to sensory stimulation [27]: select the places with sensory features that are compatible with a person's aversion.
- Perceptual overload [12]: design carefully the interaction with the mobile guide to make the system accessible and also automatically adapt the user interface to the person's special needs.
- Need to have control over the situations [22]: provide a digital visual tool that supports the planning of the activities and the itinerary so that the user can know in advance what to do and what to expect from the experience.

In order to solve these issues we are working on designing a tourist mobile guide with the following features:

- Personalization of the suggestions of places that are of interest and do not represent sources of discomfort considering the users' sensory aversions. To do this, a previous algorithm [5, 16] will be extended by introducing a dynamic component to update the user's preferences, based on the analysis of the interaction with the mobile guide.
- Take into account specific personal needs (cognitive, perceptual, etc.) and preferences in the presentation of information, making different versions of the contents available with different levels of detail, to avoid information overload and to increase the understanding of the contents.
- Providing users with a tool to plan an itinerary that supports them in a personalized way, by suggesting places to add to the itinerary according to their preferences and aversions, but also their constraints. The tool should be as visual as possible since it would allow people with autism to live the experience before it happens, in a sort of experiential training that could mitigate their fear of novelty. We should also present them with useful tips to make the travel experience easier (for example, where and how to buy a bus ticket).

In the development of the mobile guide, we will create a modular software platform that can be easily extended to manage different contests, such as different tourist places. The guide should be able to automatically feed itself from available and related information sources, such as reviews of places produced by users of social media and location-based tourist services like TripAdvisor and Booking, as well as public open data repositories.

5 CONCLUSIONS

The project is at its first stage. We are currently working to design a prototype of the mobile guide, according to the emerging user requirements. Then, we plan to iteratively test the app with patients of the Adult Autistic Center following a human-centered design approach. Moreover, we are currently working on the development of new strategies to adapt the user interface based on the users' needs. Finally, we are investigating a set of algorithms to automatically suggest itineraries given a set of places and the users' interests.

ACKNOWLEDGMENTS

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