GPT3 for Healthy Ageing?

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Abstract

For the well-being of people, in particular elderly people, AI represents a valid option to set up support system based on ICT. A large number of approach are possible, but it is important to consider that a huge quantity of technology/ies are available, with a level of robustness and reliability much higher than lab prototypes. In this sense, the discussion is about the right use and integration of these products, and in the identification of appropriate services for specific context, such as support services for elderly. In this context, even a recent, but quite questionable application such as GPT-3 can show any positive sides. The contribution analyses limits of such application and describes a first application to be integrated in eco-system for elderly well-being.

Keywords

Elderly, Well-Beiung, Artificial Intelligence

1. Introduction

Artificial Intelligence plays a role of primary importance in our lives, both professionally and personally. Many commonly used devices, such as our smart phone, contain a significant amount of AI for the most commonly used services too.

However, there are still sectors where the use can be further extended, and can lead to results of social utility, even if any application requires to be preceded by an accurate analysis of the context. One of this sector is people's well-being. The concept of well-being [1], which still responds to many definitions in the literature, is understood here as an extension of the concept of health not only as the absence of disease, but also as a balance of the physical, cognitive and social aspects of each human being.

The contribution describes a specific application of AI for the well-being of the elderly, which is part of a more general and long research of support and inclusion of people through the creation of intelligent environments[2][3][4]. For example, in the past the participation to the European AAL FOOD project, (Framework for Optimizing the prOcess of FeeDing, funded within the European AAL program, http://www.aal-europe.eu/projects/food/), from 2012 to 2015. The presence of academic partners, such as the University of Parma, industrial partners, such as INDESIT, and social partners, such as the Department Of Social Services, Local Council Brasov, made it possible to consider different aspects of the necessary processing capacity [5]. In the present, we cite the ongoing national Ermes Project: "Urban ecosystem for an active and healthy ageing", co-funded by the Italian Ministry of Health, which started in February 2023.

2. Health: from the absence of disease to the concept of well-being

People's health takes on a much broader meaning than just the absence of disease.

In fact, even according to the WHO definition, already in 1948, health assumes a meaning of a condition of physical, mental and social well-being and not just the absence of disease or infirmity [6].

Therefore, well-being integrates and complement the aspects of the treatment of specific pathologies.

The concept of health, in its broadest sense, also includes the health of healthy people, which pays particular attention to the ability of individuals to have and maintain their autonomy.

3. The elderly as a human and technological challenge.

In this sense, it remains particularly complex to deal with the problem of the health of the elderly, even in the absence of serious pathologies such as neurodegenerative diseases, but still in the presence of a slow degradation of abilities. This condition was unknown in past. Therefore, it requires in the present a careful analysis of the use of technological and "intelligent" tools, able not only to monitor the status, but that can also support the person in changing conditions.

The WHO itself [7] proposes three hypothetical trajectories of physical capacity over the years. The document give a specific description: (Chp2, pp.31): "*the intrinsic capacity remains high until the end of life, the case of the trajectory interrupted when an event causes a decrease in capacity, possibly with some recovery, and a trajectory of decline, when capabilities decline, steadily until death*". This variability of situations, which differs from individual to individual and for the same individual even over the span of life, leads to study the interaction with tools of information processing in a new way compared to the past. The problem of inclusion, which in past was limited to the accessibility of information in electronic format and on a limited set of devices such as computers, smart phones or tablets, has turned into a broader problem of supporting people in their daily activities. Nowadays people themselves have at their disposal physical objects equipped with processing capacity, from ovens to refrigerators, more generally to automated homes, or cars equipped with a series of sensors and controls for human well-being, inside and outside the vehicle, and for the efficiency of the machine.

4. From the design of new technologies to the use of current technology

In this new environment, all the techniques that are referred to as Artificial Intelligence can make a contribution of undoubted value for the creation of support systems for people in their daily activities, in the variability of her conditions and her abilities. For example for activity related to interpersonal communication our group developed an application [8] that takes into account not only the static and dynamic profile of the user, but also the conditions of the people around him, in a dimension of relationships between people, with the use of Machine Learning tools. In addition, we have examined the activity of pedestrian mobility [9], where a specific approach of Reinforcement Learning has been used to optimize routes according to people's abilities and preferences, coherently with the physical environment.

During all these consecutive developments of support services in different context, it has emerged the current remarkable development of information technologies. This leads us to evaluate two solutions regarding the application to current problems:

- proceed with the development of new technologies,
- consider an intensive use of the technologies currently available, optimized for the purpose.

Often the analysis of the resources offered by the available products, commercial or free, is limited only to the most advertised characteristics, while the robustness, reliability and updating characteristics that these products can guarantee are ignored.

An example is represented by the social networks, which, from applications for young people, have become important communication tools also at a social level.

5. GPT-3

Currently the problem reoccurs for applications of Generative Artificial Intelligence, in particular GPT-3 [10] which apparently (this is the first misunderstanding) produces a language that cannot be differentiated from a language produced by human beings, for both conversation and text.

(A note: Currently a GPT-4 version is also available, but its recent release has not yet allowed an adequate evaluation).

The power of the product in terms of parameters and training data is known.

Our analysis on the possibility of using these tools for support services for elderly started from the identification of the present limits. In literature, we have selected two works [11], [12], where the authors insert a careful list of critical, but also favorable aspects of this powerful and controversial tool. Both contributions highlight the fact that there are considerable limitations; especially if you think you can use the system as a tool to obtain a conversation system (does not replace a conversation with another human being).

Obviously there are some elements to take into consideration for example if the system is directly addressed to the person, the range of topics (topics) to be considered must be limited to a spectrum of contexts and with a series of constraints, achieved through a few shots or through an accurate fine tuning.

These systems must in any case be used in a context there it is possible the involvement of a person in the process (a care-giver), or where the truth of the statements issued is not essential, as in the case of health data.

In the context of people support services, and with the idea of creating an ecosystem that supports people in their daily activities, we have developed a first application for preliminary testing both the power of the system and the difficulties of integrating it into an ecosystem.

6. The application

The system (Figure 1) has an interface with the user via app, capable of intercepting the user's request in vocal mode and in Italian language. This message is transformed into text and can be sent to GPT-3, which provides the response.

In our application, the audio file is also processed by a SER (Speech emotion Recognition) [13] capable of intercepting the user's mood. These element then integrating the content of the message (vocal first, then textual) with the emotion with which it is expressed. This means a higher level of information. For an even greater level of customization, the prompt can be customized by also adding information relating to the user profile, on the psychophysical situation.

Regardless of the personal data management problems, on which we are working in parallel [14], it is very important to consider how the request is more specified with the addition of the mood and the user static profile.

It is more as a pre-screening of the situation, than as a definitive answer. Even for a test session, the interaction can take place not directly with the subject, but with those who take care of the subject, such as caregivers.
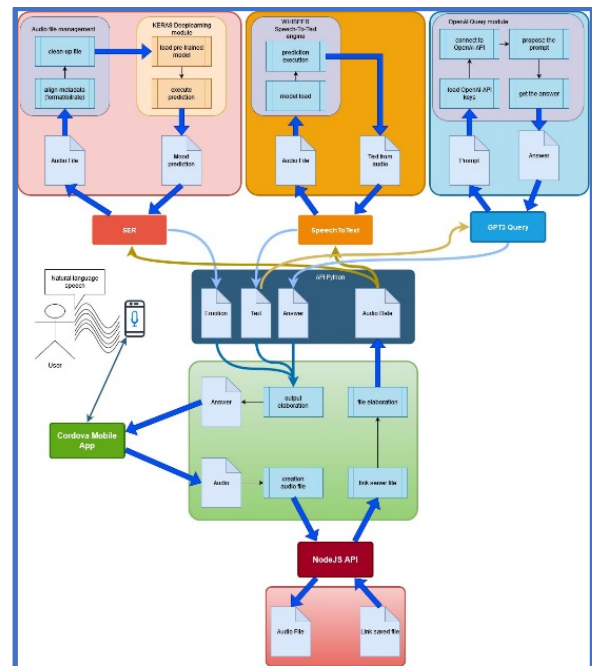

Figure 1General structure of the system

A HW and SW prototype is under study, which also combines environmental data acquisition sources.

The idea is therefore once again to use the devices not as an alternative to the relationship with people, but as an improvement in conditions.

7. Evaluation

Since the system is still under development, a complete evaluation has not been completed. A first expert evaluation has been carried out with the help of GPT-3 experts.

In order to proceed with this step, an appropriate interface is under development in order to distinguish between caregiver interface and elderly interface.

8. Future developments

In order to improve the results produced by the algorithm, ad hoc solutions will be applied during the training and preparation of the model.

Among the options that can be implemented, there is both the possibility of performing fine-tuning operations on the data (in order to increase the level of knowledge of the model about a specific topic), and of using other query methods, always taking advantage of the OpenAi as a basis for inference.

The selection of the right tools and their application will necessarily go through a phase of testing/analysis of the results

9. Conclusions

The application of Artificial Intelligence can be useful both for health, but more generally for the well-being of people. Among these, a particularly challenging reference is represented by elderly people whose profile presents greater dynamism over time and a diversity between individual and individual. The possibility of building support systems in daily activities with the help of Artificial Intelligence represents a reality rather than a challenge.

10. References

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