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DEVELOPMENT OF AN EASY-TO-USE APPLICATION WITH ARTIFICIAL INTELLIGENCE TO SUPPORT DIGITAL INCLUSION FOR THE ELDERLY

DESENVOLVIMENTO DE UM APLICATIVO DE FÁCIL USO COM INTELIGÊNCIA ARTIFICIAL PARA APOIAR A INCLUSÃO DIGITAL DE IDOSOS

DESARROLLO DE UNA APLICACIÓN DE FÁCIL USO CON INTELIGENCIA ARTIFICIAL PARA APOYAR LA INCLUSIÓN DIGITAL DE PERSONAS MAYORES

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ABSTRACT

The research included the elderly population through the development of the FacilitaApp mobile application for Android, using features such as a virtual assistant, automatic content reading, website reliability verification, news summaries, and accessibility features, aligned with the principles of Universal Design and Participatory Design, based on the lessons learned throughout the research. The proposal arose from observing the difficulties faced by this audience in using digital technologies, such as vision problems, motor limitations, fear of virtual fraud, and low familiarity with complex interfaces. Thus, the project seeks to promote citizenship, autonomy, and human dignity for older adults in the digital environment.

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Keywords: Digital Inclusion. Elderly Population. Mobile Application. Artificial Intelligence. Accessibility. Universal Design. Participatory Design. FacilitaApp.

RESUMO
A pesquisa incluiu a população idosa por meio do desenvolvimento do aplicativo móvel FacilitaApp para Android, utilizando recursos como assistente virtual, leitura automática de conteúdos, verificação de confiabilidade de sites, resumos de notícias e funcionalidades de acessibilidade, alinhados aos princípios do Design Universal e do Design Participativo, com base nas lições aprendidas ao longo da pesquisa. A proposta surgiu da observação das dificuldades enfrentadas por esse público no uso de tecnologias digitais, como problemas de visão, limitações motoras, medo de fraudes virtuais e baixa familiaridade com interfaces complexas. Assim, o projeto busca promover cidadania, autonomia e dignidade humana para pessoas idosas no ambiente digital.

Palavras-chave: Inclusão Digital. População Idosa. Aplicativo Móvel. Inteligência Artificial. Acessibilidade. Design Universal. Design Participativo. FacilitaApp.

RESUMEN
La investigación incluyó a la población adulta mayor mediante el desarrollo de la aplicación móvil FacilitaApp para Android, utilizando recursos como asistente virtual, lectura automática de contenidos, verificación de confiabilidad de sitios web, resúmenes de noticias y funciones de accesibilidad, alineadas con los principios del Diseño Universal y del Diseño Participativo, basados en los aprendizajes obtenidos a lo largo de la investigación. La propuesta surgió de la observación de las dificultades que enfrenta este público en el uso de tecnologías digitales, como problemas de visión, limitaciones motoras, miedo a fraudes virtuales y baja familiaridad con interfaces complejas. Así, el proyecto busca promover ciudadanía, autonomía y dignidad humana para las personas mayores en el entorno digital.

Palabras clave: Inclusión Digital. Población Adulta Mayor. Aplicación Móvil. Inteligencia Artificial. Accesibilidad. Diseño Universal. Diseño Participativo. FacilitaApp.

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1 INTRODUCTION

The sustainability and growth of contemporary organizations is intrinsically linked to their ability to identify, assess and mitigate risks efficiently, because in this context, risk is understood as the possibility of events occurring whose outcomes differ from what is expected, which could compromise organizational stability, given that large corporations, especially in the financial sector, have institutional risk management guidelines, which guide the actions of employees in the face of adverse situations. Among the various types of risk, reputational risk stands out, which has a direct impact on the trust placed in the organization by stakeholders such as customers, suppliers, employees, regulatory bodies and society in general.

The Brazilian population is aging more each year, and population aging is one of the most significant social transformations of the 21st century. According to Mendes, Corrêa, and Andrigo et al. (2020, p. 224), "the aging of the Brazilian population corresponds to 'a global phenomenon of the 21st century.'" It is estimated that the percentage of children will be surpassed by the percentage of elderly people in the Brazilian population by 2031. According to data from the Brazilian Institute of Geography and Statistics (IBGE, 2022), by 2100 the world could reach 3.1 billion elderly people. Compared to 2024, which has 1.1 billion elderly people, the elderly population is likely to triple, which is related to declining fertility rates and improved life expectancy.

The phenomenon of population aging brings with it several challenges, such as digital exclusion, given that the elderly face challenges related to cognitive and motor limitations and a lack of familiarity with digital environments. With the advancement of technology, the use of mobile devices has become increasingly essential to quality of life, as they contribute to autonomy, leisure, and access to information. In Brazil, according to the IBGE (2023):

Although Internet use has been growing in almost all groups, the expansion has been most rapid among the elderly. In 2016, the proportion of older adults using the Internet was 24.7%, and between 2019 and 2023, the increase in the 60+ age group was 21.2 percentage points, and in the 50-59 age group, 13.6 percentage points. Compared to 2022, these groups also showed the largest increases in the percentage of Internet users (3.9 p.p. and 1.7 p.p., respectively).

Thus, with the validation of the growth in internet use among the elderly, it is even more necessary to develop resources that promote digital inclusion. According to the Web Content Accessibility Guidelines (WCAG), the main difficulties faced by the elderly are: vision,

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physical ability, hearing, and cognitive ability. In this sense, “technologies must be adapted to the needs of the elderly in the future, so that they do not feel excluded or ignored in relation to the rapid development of these technologies and globalization.” (NÚNCIO; ROMÃO, 2015, p. 29).

In addition to the challenges already mentioned, many applications have not been developed with a focus on the specific needs of the elderly, with complex interfaces, small fonts, low contrast, and unintuitive navigation, making it difficult for this group to interact with digital technologies. According to Wickramathilaka et al. (2025), most mobile applications fail to meet the usability and accessibility preferences of older adults, resulting in significant barriers for this group.

However, when developing technological solutions aimed at this audience, it is necessary to involve them in the creation process. One of the methodologies to be considered is participatory design, which allows older adults to contribute their needs and knowledge, resulting in more effective products. According to Wickramathilaka et al. (2025), the active participation of older adults in the process of designing and customizing mobile applications allows for the identification of specific barriers and the adjustment of technological resources in a more effective and accessible way.

In this context, it is essential to ensure that the design is inclusive so that everyone has the ability to enjoy technological resources. Aware of all limitations and following the principles of Universal Design, user-centered design, especially for the elderly, should consider elements such as simplicity in navigation, intuitive interface, adequate contrast, and larger fonts, avoiding handwritten style.

Artificial intelligence (AI) emerges as a tool to assist the elderly in interacting with technology. According to Gerovitae Magazine (2023), AI has several ways to benefit the elderly, such as in health support, through the collection and analysis of medical information and sending alerts for medication administration, in strengthening independence and safety, with monitoring features that provide safety for the elderly at home, and in reducing social isolation.

In 2023, the Constitution, Justice, and Citizenship Commission (CCJ) of the Chamber of Deputies approved a proposal to recognize digital inclusion as a fundamental right. Given this scenario, this work proposes the development of an application with features based on artificial intelligence, aimed at facilitating the use of digital technologies by older adults, promoting their digital inclusion. The proposal seeks to integrate features such as a virtual

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assistant, automated content reading, website reliability verification, and news summaries, contributing to the safe and autonomous use of technology by this audience.

Considering the social relevance of the theme and the constant advancement of digital technologies, it is essential to develop solutions that not only offer access but also respect and embrace the particularities of aging. Thus, this project created the FacilitaApp application, which aims precisely to facilitate the digital inclusion of the elderly population, so that it is possible to promote citizenship, autonomy, and human dignity, contributing to active and participatory aging.

The application has features based on artificial intelligence and was developed with a focus on accessibility, simplicity, and usability. Thus, this work is part of a scenario in which technology and social responsibility go hand in hand, proposing a viable and functional alternative to reduce digital exclusion and expand opportunities for the inclusion of the elderly in the digital environment.

2 THEORETICAL BACKGROUND

This section aims to provide a theoretical basis for the central concepts of this work, with an emphasis on the digital inclusion of the elderly population through accessible and intelligent technologies. To this end, we discuss the conceptual foundations of the main areas involved, such as Artificial Intelligence, Universal Design, Participatory Design, and Digital Accessibility, Machine Learning, as well as their practical applications and interrelationships with the areas of Production Engineering, Information Technology, and Computer Science. The construction of this theoretical framework also includes the presentation of related studies and projects that serve as a basis for the development of FacilitaApp, a mobile application aimed at promoting the autonomy, citizenship, and human dignity of older adults in the digital environment.

2.1 THE ELDERLY POPULATION AND THEIR DIFFICULTIES WITH DIGITAL INCLUSION

As mentioned in previous chapters, the elderly population is growing in Brazil and worldwide, bringing challenges and opportunities for technological development. According to the Brazilian Institute of Geography and Statistics (2024), by 2070, the elderly will be the largest age group in the country, with an average of 4 out of every 10 people, representing almost 38% of the Brazilian population. However, although this is considered progress, it also brings some difficulties for this age group, mainly related to digital inclusion.

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The physical and cognitive difficulties of the elderly are among the main ones, because as aging progresses, this population tends to develop vision problems, such as presbyopia, which is characterized by worsening vision with age, decreased contrast sensitivity, motor problems, such as tremors or arthritis, and hearing problems, in addition to memory impairments, which end up being an obstacle to learning new technologies. Wickramathilaka et al. (2025) confirm these difficulties, reporting in experiments that elderly users face problems when reading text on smaller screens, dealing with low contrast in user interface colors, and interacting with small buttons and data entry fields.

Another common problem is the perceived lack of security in the use of technology. Many older adults are afraid of damaging technological devices (LAVOR et al., 2023) and are concerned about fraud and online scams due to their lack of knowledge. In addition, there are also psychological limitations. According to Lavor et al., older adults feel ashamed for not

know how to use it, end up feeling digitally excluded, and withdraw. In a survey conducted by Álvaro et al. (2022, p. 4), two respondents stated:

We feel ashamed... Because a colleague sends a photo, and then you search and search, but you can't find the photo. Oh, I didn't see that photo! How do I send it? Then we feel embarrassed, right?! (P1, Female, 67 years old). I'm afraid to touch this machine and break it (P12, Male, 76 years old).

Lack of access to these technologies is another factor. Due to socioeconomic inequality, many older adults do not have access to digital devices or an internet connection. Even when they do, they cannot easily find learning methods and support, such as courses and training tailored to teach them.

Furthermore, applications are not designed with this age group in mind, which further highlights the lack of digital literacy, as it hinders the understanding of basic concepts related to the use of technology. Patrício and Osório (2016, p. 2) clarify that digital literacy is "the set of skills necessary for an individual to understand and use information critically and strategically, in multiple formats, from various sources, and presented through computers." That said, Dias et al. (2024) reinforce that digital literacy is essential to ensure the inclusion of this group, especially in contexts involving autonomy, communication with family members, and improvement in quality of life.

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2.2 LANGUAGES AND FRAMEWORKS USED

The programming languages used for developing native Android applications are Java and Kotlin, both of which serve the same purpose, but Kotlin is currently the one most recommended by Android. The first language recommended by Google for application development was Java in 2017, an object-oriented and multi-platform language that has limitations, such as long code blocks, security issues, and lack of extensibility (MARTÍNEZ VACA, 2021).

Because of this, according to the Android developer manual (2025), the Kotlin language, which was chosen for the creation of the FacilitaApp application since 2017, it´s recommended as the main language and used by more than 60% of professional developers. These advantages make Kotlin a more practical language for developing current applications because it has a simpler and more straightforward syntax, reduces the chance of common errors, such as those related to null values, and is also compatible with Java, which facilitates its effective adoption in existing projects. Another important point is that Kotlin is better suited to modern development practices, such as creating interfaces with Jetpack Compose, used in this project, and integration with other Android tools, which contributes to more organized and productive development. Table 1 presents a comparison between the main features of the Java and Kotlin languages, highlighting functionalities that directly impact productivity, security, and code maintenance in Android application development.

Table 1

Comparison between Java and Kotlin in Android development

Parameter	**Java**	**Kotlin**
Compilation	Bytecodes	Máquina Virtual
Nullability Protection	✗	✓
Lambda Expressions	✗	✓
Invariant Array	✗	✓
Non-Private Fields	✓	✗

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Smart Casts	✗	✓
Static Members	✓	✗
Wildcard Types	✓	✗
Singleton Objects	✓	✓

Source: Prepared by the authors.

Additionally, when choosing the user interface for this project, both imperative and declarative paradigms were considered, and consequently, the concepts of cohesion and coupling were used, as shown in Figure 1, where, according to Fjodorovs and Kodors (2021):

When writing code, modules composed of multiple units are created. Coupling occurs when there is a dependency between these units of different modules, that is, when parts of one module influence parts of another. Cohesion, on the other hand, is related to how the units of the same module organize and cooperate with each other, where the greater the cohesion, the better grouped and functional these units are within the module.

When analyzing the imperative paradigm, it should be noted that the interface must be defined in order to achieve the desired objective, and for this, XML is used. With its use, “developers must manually define when and how interface elements should be updated based on user interactions or data changes” (SAEED, 2021, p. 9).

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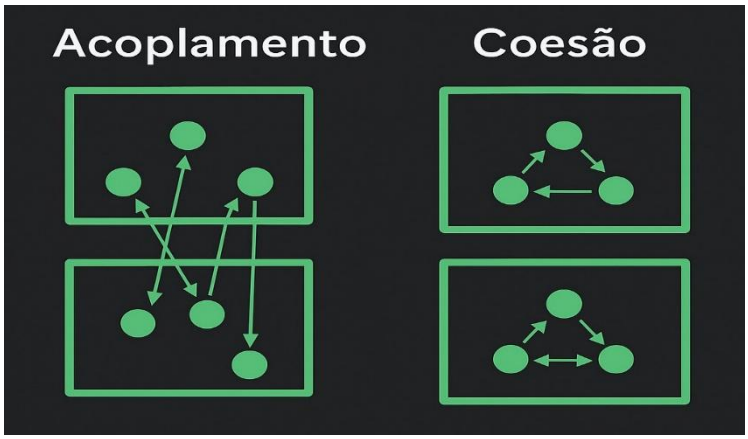
Figure 1

Principles of coupling and cohesion



Source: Adapted from FJODOROVS; Iļja (2021).

One of the biggest challenges of this type of paradigm is state management, when the state of the interface needs to be controlled manually. Without proper control

of transitions and different types of states, bugs or unexpected behavior are common. Therefore, in this project, the declarative paradigm was chosen, since, in addition to being currently recommended in Android development, developers actually describe how the interface should be created based on the current state (SAEED, 2021, p. 10).

Thus, Jetpack Compose is the toolkit adopted in this project for building the user interface, as it allows the entire UI to be developed directly in Kotlin, eliminating the need for XML and providing more cohesion between modules. With the use of Compose, the UI becomes reactive to the current state of the application, which means that any change in state is automatically reflected in the interface, without the need for manual assembly and reducing visual inconsistencies and flaws in logic. In addition, its integration with other Jetpack libraries facilitates project maintenance and the implementation of good architectural practices.

2.3 ARTIFICIAL INTELLIGENCE

According to Google (2024), artificial intelligence (AI) is “a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand, and translate spoken and written languages, analyze data, make recommendations, and much more,” that is, it is a technology that collects and learns from data, identifying patterns produced by humans and other sources, and that helps solve

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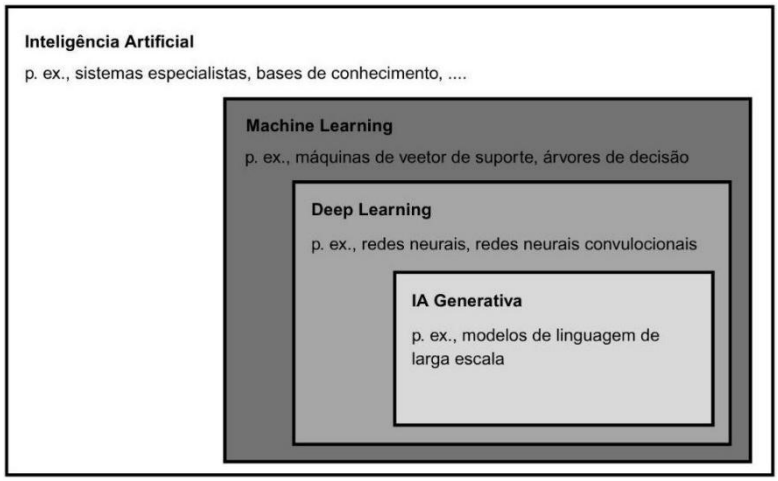
problems. Russell and Norvig (2021) define AI as systems that simulate human intelligence to solve complex problems.

Artificial intelligence operates by analyzing large volumes of data to create intelligent models that simulate human activities, but there is no single approach to understanding how artificial intelligence works, as there are several techniques, such as machine learning, deep learning, and natural language processing, each with its own methodologies and applications (Ferreira et al., 2025).

There are different types of artificial intelligence with different applications and capabilities. One of the most widely used categories is Generative AI, which is a form of artificial intelligence that uses machine learning and deep learning methods to create new data (HAO; GUO, 2023). Generative AI uses advanced algorithms, such as deep neural networks and large language models (LLMs), to generate original and meaningful results. The most widely used and well-known models today are ChatGPT, Gemini, and Deepseek. Some researchers wonder if there are still signs of artificial intelligence in this category, considering that, over time, the ability to generate high-quality content that is indistinguishable from human-created work is becoming more evident (BUBECK et al., 2023; The Washington Post, 2022).

Figure 2

Relationship between Generative AI and other AI concepts



Source: Adapted from Generative Artificial Intelligence, 2023, p. 2. Inspired by Goodfellow et al. (2016) and Janiesch et al. (2021).

In addition to functional classifications, such as Generative AI, AI can also be classified according to its level of cognitive sophistication, as proposed by Marr (2021), into the

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following categories: reactive, limited memory, theory of mind, and self-aware. Reactive AI operates based on recent data, meaning it cannot predict or learn. It is the “simplest type of technology, corresponding to machines that operate exclusively based on present data, without the ability to form inferences from current data to evaluate possible future situations” (RIBEIRO, 2022), for example, some basic recommendation systems on e-commerce sites, as they make recommendations based on what is currently being viewed and do not consider past purchases.

Limited memory technology, on the other hand, can search for information from the past, which allows it to predict and make informed decisions, but they have short-term memory. An example is autonomous cars, which consider recent data from sensors (cameras, radar, and LiDAR) to understand the surrounding environment and predict the movement of other vehicles and pedestrians, allowing decisions such as changing lanes or braking, based on events that occurred a few seconds ago.

In AI with theory of mind, machines think and are able to make decisions and simulate abilities like humans, understanding emotions and intentions. According to Marr (2021), “machines would have the ability to understand and remember emotions and adjust behavior based on those emotions, just as humans can do in social interactions.” Furthermore, in the self-aware category, AI is conscious of itself, has a very high level of intelligence compared to others, and surpasses human intelligence, according to Pereira (2025):

This category of Self-Aware AI fits into a very advanced concept in the classification by level of similarity, that is, AI systems that have self-awareness, with the ability to recognize their own existence and identity as separate entities.

2.3.1 Machine Learning

Machine learning is a subfield of artificial intelligence and involves a data analysis technique that automatically builds predictive models, enabling computers to improve their performance and learn on their own (SHARIFANI; AMINI, 2023). According to Morais (2020, p. 155), “while AI can be broadly defined as the science capable of mimicking human abilities, machine learning is a specific branch of AI that trains machines to learn from data.”

Thus, this branch of artificial intelligence works through experience with data and not with predefined rules, that is, without being explicitly programmed. According to Fernanda Lage:

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It is a subset of AI and a superset of deep machine learning. In general, the goal of machine learning is to understand the structure of data and integrate it into models that can be understood and used by everyone. Machine learning can also be defined as the process of solving a practical problem by (1) gathering a set of data, (2) algorithmically constructing a statistical model based on that set of data, (3) training the model, and (4) solving the practical problem. (LAGE, 2021, p. 71-72).

There are several ways of learning based on data and the desired result. One of them is supervised learning, which is used for commercial applications. In this case, algorithms are trained on labeled data sets to perform classification or prediction of business data (JANIESCH et al., 2021). The algorithm maps the inputs and outputs and uses them uses them to make predictions. Renata Vilenky (2021, p. 25-26) says that the machine learning process is similar to teaching a child, since you must instruct a child on what to do, as they start out as a blank slate and if taught incorrectly, they will replicate the mistakes.

In addition to this, there is also unsupervised learning, which is when the model discovers hidden patterns in unlabeled and unclassified data. According to Dridi (2024), “algorithms can classify, label, and group data points within data sets without any external guidance to perform this task,” This leaves it alone to find the structure of the input set, and instead of learning from examples of correct input and output, as in supervised learning, unsupervised learning focuses on finding the relationships inherent in the data itself.

Finally, there is also reinforcement learning, a trial-and-error learning process that causes the model to take actions in an environment to maximize a reward (NUNES et al., 2023), i.e., it receives rewards for the actions performed and updates its weights to improve its future actions and punishments for wrong actions.

Machine Learning enables the existence of more complex systems, such as Deep Learning, and consequently, Large Language Models (LLMs) such as Gemini, as its principles enable it to understand and generate language in a more robust way, providing the tools and algorithms for systems such as chat to process and interact with information, laying the foundations for innovations that will be explored in detail in the following topics.

2.3.2 LLMs

Large Language Models (LLMs) are “a type of artificial intelligence model that has been trained by deep learning algorithms to recognize, generate, translate, and/or summarize large amounts of written human language and textual data” (EUROPEAN COMMISSION,

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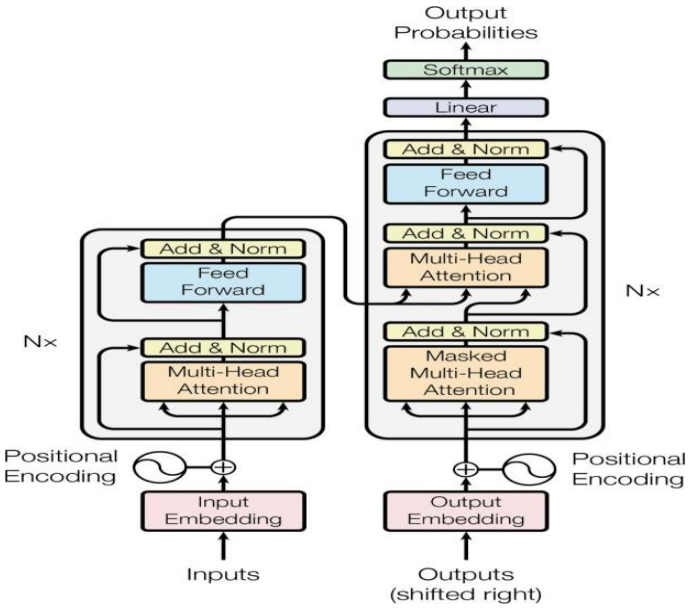
2024). They represent a type of deep neural network that uses an architecture called Transformers, which enables the model to process and understand more difficult contexts and capture relationships between distant words in the text (MANAGEMENT SOLUTIONS, 2024).

This architecture, which does not depend on rigid sequences, can process texts in order to capture long-term context, making it ideal for tasks involving textual sequences. As shown in Figure 5, there are two components: the encoder, which processes input, and the decoder, which generates output (LIN, 2023).

Figure 3

Transformer Model Architecture



Source: VASWANI, A. et al. Attention Is All You Need. [S. l.]: arXiv preprint, 2017. p. 30, fig. 1.

This architecture makes it possible to perform different tasks, such as text generation, sentiment analysis, translation, and even natural conversation. Some examples of LLMs on the market today are: GPT Series (OpenAI), Gemini (Google), Claude (Anthropic), and others.

What makes LLM models the leading ones today is the training that involves two phases: pre-training, which is when the model absorbs large-scale unlabeled data, and fine-tuning, in which the model is refined with more specific and labeled data to perform tasks with greater accuracy (OPENAI, 2023). In pre-training, the model learns statistical patterns of language, such as grammatical structure, style, and the meaning of words in different

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contexts, while in fine-tuning, it is adjusted for specific applications (MANAGEMENT SOLUTIONS, 2024).

In the pre-training of Gemini, the model used in this project, a non-autoregressive model is used, which means that it does not generate one word at a time based only on the previous ones, but considers the complete sequence to predict missing words or rearrange sentences (MANAGEMENT SOLUTIONS, 2024). In addition, Gemini adopts a multimodal architecture from the outset, which means that it is trained not only with textual data, but also with images, videos, and audio, which increases its ability to interpret information in different formats.

2.3.4 APIs and Libraries Used in the Project

For the development of the project, several APIs and libraries were used, each with a specific purpose, ensuring the functionality and robustness of the application:

- GNews API: Used for news integration, allowing the display of articles from different sources on general topics, keeping the user up to date with relevant information.
- SerpAPI: Used to recommend the most downloaded apps from the Play Store.
- Google Play Services SafetyNet: Used to determine whether a specific URL is classified as a threat by Google, essential for application security, protecting the user against abuse and fraudulent activities.
- Coil (with OkHttp): Coil enabled the loading of images from apps recommended by SerpAPI.
- Retrofit: As a Type-safe HTTP client for Android and Java, used to simplify communication with RESTful APIs, facilitating network requests and handling responses in an organized manner.
- Google AI Generative AI: Integrated to incorporate generative artificial intelligence features, enabling the creation of advanced functionalities such as text generation, summarization, or other AI-based interactions.
- Hilt: Dependency injection framework.

4 PROBLEM STATEMENT

The aging of the population is a global phenomenon, and almost all countries in the world are experiencing growth in their elderly populations, driven mainly by declining fertility rates. According to the United Nations Department of Economic and Social Affairs (2020),

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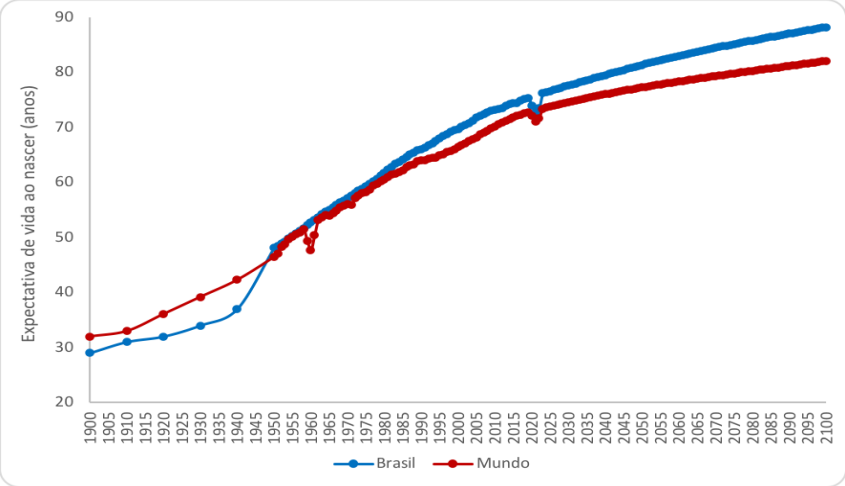
even nations experiencing rapid economic growth will face an increase in their elderly populations over the next 30 years. Also according to the United Nations, researchers say that life expectancy reached 73.3 years in 2024, an increase of 8.4 years since 1995, and that it will only increase in the coming decades as a result of declining mortality rates (2024).

Figure 4

Life expectancy at birth in Brazil and worldwide: 1900–2100



Source: Our World in Data and UN/Population Division: World Population Prospects 2022

At the same time, society is undergoing a digital transformation with the advancement of technology. According to data from the National Common Core Curriculum (BNCC, 2022), the use of Digital Information Technologies (TDIC) has influenced the population since the end of the 20th century, changing the way people work, communicate, learn, and build relationships. TDIC is defined as a "set of technologies that allows,

mainly, the transformation of any language or data into numbers, that is, into zeros and ones (0 and 1)" (RIBEIRO, 2023).

Research indicates that the concept of “lifelong learning” has become established as a central principle when considering aging, highlighting that older people have the ability to acquire new knowledge over time (HOSNJAK et al., 2020). Currently in Brazil, there has been an increase in internet use by people aged 60 and over, from 24.7% in 2016 to 66.0% in 2023 (Figure 2), according to data from the IBGE's Continuous National Household Sample Survey (PNAD Contínua). However, despite this progress, difficulties related to the digital inclusion of older adults still exist, mainly due to the decline in their motor, sensory, and physical abilities resulting from advancing age (SILVA; MATTOS; OLIVEIRA, 2019).

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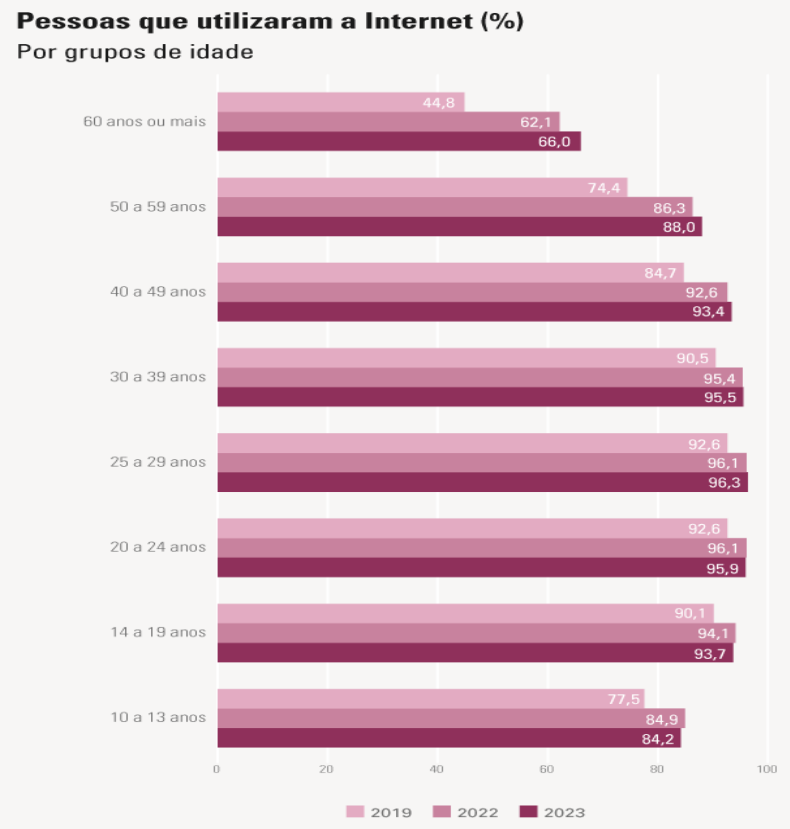
Figure 5

Percentage of people who used the Internet (2019-2022-2023)



Source: Continuous National Household Sample Survey (PNAD) by the Brazilian Institute of Geography and Statistics, 2024.

It should be noted that many older adults face challenges that go beyond a lack of familiarity with technology, including: deteriorating vision and hearing, slower information processing, lack of knowledge, and the perception that technology is complicated and dangerous. This view, often fueled by the proliferation of online fraud and scams (MATOS; ALMEIDA, 2020), generates alarm and prejudice against its use

and as app designs feature small buttons, difficult-to-read fonts, non-intuitive navigation, and overly complex steps, they end up making the experience frustrating and ineffective for older adults (FREIRE; FONSECA, 2021).

Given this scenario, would it be possible to develop an application to solve and meet these needs and specificities of the elderly population, offering more accessible, functional, and intuitive support? The research is aimed at creating a facilitator application based on artificial intelligence, with automated text reading (Text-to-speech), voice recognition, news summaries, website security checks, shortcuts for installing popular applications, use of large fonts, and adequate color contrast, focusing on the elderly user's experience and autonomy.

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5 METHODOLOGY

The methodological guidelines for this study are based on an understanding of digital inclusion, active aging, digital accessibility, and artificial intelligence, obtained through reading books, the internet, academic articles, newspapers, and magazines, in addition to guidance from the advisor involved in the study.

The following methodological roadmap was followed for this study:

a) Summary of concepts related to the problem, such as digital inclusion, the main difficulties faced by older adults in using mobile devices, Artificial Intelligence, and accessibility;

b) Formulation of the Proposed Problem;

c) Techniques used to solve the problem;

d) Solution presented for the proposed problem; and

e) Future work and final considerations.

6 PROPOSED SOLUTION

The solution developed consists of FacilitaApp, an Android application created to support users with less technological familiarity, offering accessible, secure, and AI-assisted navigation. The development was based on the Kotlin language and the Jetpack Compose framework, chosen for offering greater integration with native Android features and meeting requirements such as accessibility, low cost, compatibility, and ease of updating.

The architecture adopted follows the MVVM pattern, with a modular structure by functionality, ensuring organization, component reuse, and clear separation between interface and logic. Each module has its own ViewModel, responsible for state control and asynchronous calls, using StateFlow to manage transitions between loading, success, and error states. Dependency injection is performed with Hilt, simplifying project maintenance and evolution.

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Figure 6

App view and source code

Source: Prepared by the authors.

Among the main features implemented are:

- **Intelligent chat integrated with the Gemini 1.5 Flash model**, enabling contextual responses and conversational support.
- **Accessibility features, including Text-to-Speech (TTS) and Speech-to-Text (STT),** enabling voice interaction and reading of responses.
- **Website security verification** through the **Google SafetyNet API**, offering guidance against potentially malicious pages.
- **Useful apps section**, integrated with the **Serp API**, facilitating quick access to reliable tools.
- **News tab**, where articles are automatically **summarized by the Gemini model**, optimizing comprehension and reading time.
- **Persistence of preferences**, such as voice assistant activation, performed with **DataStore**.

In this way, FacilitaApp integrates AI, accessibility, and digital security features in a lightweight, intuitive way that is aligned with the needs of the target audience, promoting autonomy in the use of technologies and online environments.

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7 FINAL THOUGHTS

This work aimed to propose an accessible, functional, and technological solution supported by Artificial Intelligence to assist the elderly population in digital inclusion. It is considered that the present study and the resulting project have largely achieved their objective by delivering the implemented functionalities. Based on understanding the main challenges faced by this audience, the FacilitaApp was developed, integrating features such as automated text reading (Text-to-Speech), voice recognition (STT), application recommendations, website reliability verification, and simplified news summaries, grounded in the principles of Universal Design and Participatory Design.

The development process was guided by technical criteria such as low cost, compatibility with widely used devices, accessibility, and security. Decisions involving the use of libraries and frameworks, including Jetpack Compose, Google Gemini, and SerpAPI, proved effective in making the solution feasible within the context of an academic project and its constraints.

However, some limitations were observed during development, such as the need for user testing with elderly participants to measure the real impact of the functionalities on the target audience's experience. Additionally, voice command interpretation and the pronunciation of less common names or expressions presented variations that need improvement in future iterations.

Regarding future work, there is an intention to advance testing with elderly users to collect practical feedback and implement adjustments requested by this audience. It is also planned to expand offline support through caching basic content without internet dependence, add new functionalities such as tutorials for commonly used applications, enable accessibility resources through TalkBack for visually impaired users, and develop an onboarding process to guide first-time users through the application.

Therefore, we consider that the conscious and purposeful use of technology can act as a facilitator in promoting citizenship, autonomy, and quality of life for older adults, and FacilitaApp can contribute meaningfully to this process.

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