

AI Health 2024

Athens, Greece

The Role of Artificial Intelligence and Machine Learning in Predictive Health Care, Diagnostics, and Personalized Treatment for Seniors

AI-based Health Systems and Applications; Personalized Health devices and mobile services

Authors and Presenters

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Presenters



Rüdiger Höfert

Graduate Computer Scientist

Founder and CEO of **Absolute Software** and **ArgusEyes.AI**

Specialized in AI, focusing on Natural Language Processing (NLP) and Computer Vision

Expertise in Digital Twin technology, including consulting, conception, and programming

Experienced in Virtual Reality (VR) and Augmented Reality (AR) project development



Wolfgang Bench

Master of Arts in International Studies

Business Development and Project Manager at **Absolute Software**, specializing in AI projects

Responsible for public relations within the company

Developing and managing AI solutions and maintaining key stakeholder relationships

Introduction



Global aging trends show **770 million people** aged 65+, with care needs exceeding a billion.

By 2050, the caregiver to care recipient ratio may drop from **7:1 (2011) to 3:1**.



Skilled worker shortage in care facilities leads to staff overburden and challenges in quality care.



Aging is associated with reduced cognitive, social, and physical abilities, increasing **loneliness** and anxiety.

Limited social interactions and challenges contribute to accelerated decline in physical and mental health.



Emergencies often unnoticed due to limitations like inaccessible alarm buttons.

Introduction II

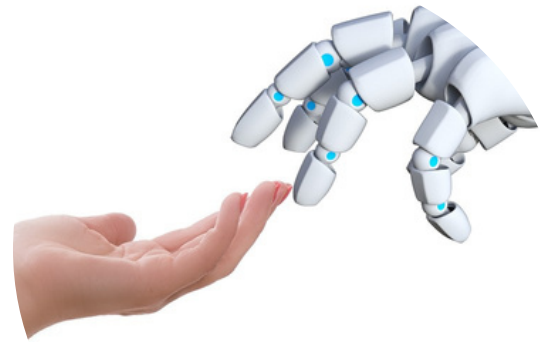


Artificial Intelligence and **Machine Learning** as transformative technologies for predictive health care, diagnostics, personalized treatment.



Artificial Intelligence and **Machine Learning** aim to **augment, not replace**, human care.

Current State of the Art Solutions



Robotics

Companion robots and assistants for physical tasks, social interaction, and monitoring.



Smart Applications

Wearable health monitors and smart home systems for safety and health monitoring.



Virtual Reality (VR) and Augmented Reality (AR)

For cognitive stimulation and social interaction.



Limitations

While addressing physical health and safety, these do not fully tackle loneliness and isolation's long-term problem.

Methods, Materials and Tools

Advanced AI technologies for elderly care require a comprehensive methodological approach, with **proven computer science** and **AI methods**.

Data analysis, pattern recognition, and **big data analytics** play a crucial role in identifying health status and behavior patterns of seniors, crucial for **training AI models** tailored to their needs.

AI frameworks selected prioritize **adaptive learning capabilities**, enabling **personalized experiences**. **GPT-based models** are preferred for natural, fluent communication.

Machine learning libraries and environments, especially **TensorFlow** and **Keras**, are used for developing **deep learning models**. OpenAI GPT platforms underpin the development of language AI.

Cloud-based services ensure scalability and **secure data** access, with a strong focus on **data protection** and compliance with European standards, ensuring seniors' privacy and safety.

The methodology integrates these tools and methods to develop AI systems that simulate personal interaction, support individual learning, and enhance cognitive stimulation and seniors' well-being.

Concept

The concept elaborated below describes an AI-based assistance system specifically designed to support seniors in their own homes, significantly improving their quality of life. The system is **currently in development**.

Description of the Solution



AI Avatar family on tablets focusing on empathy to address senior loneliness. Utilizes **advanced AI** for personalized, compassionate interactions. **Adapts** to individual senior's emotional states and preferences. Designed for **ease of use** by seniors, promoting engagement.



Aims to mitigate **loneliness**, supporting **mental** and emotional health. Initial implementation in care facilities for real-world feedback. **Privacy and data protection** integrated into the solution's design.

Description of the Solution II



The system enables **natural dialogue** through **speech recognition** and **NLP**, responding to both pre-programmed commands and free-flowing dialogues.



It **adapts to user behavior, speech, sentiment, and cognitive patterns**, integrating life stories, personal preferences, and relationships for **personalized interactions**.



Behavior analysis **monitors movement** and word usage, **detecting deviations** and triggering alerts to professionals or relatives for significant changes.



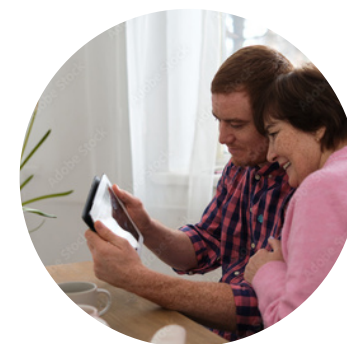
Offers **cognitive activities** and games for mental stimulation, with regular updates.



Facilitates **network connectivity**, allowing family and caregivers to communicate with seniors.



Includes **emergency response** features and daily task reminders.



Simple setup process involving just an email address and customer number, easily done by family or nursing staff.



Scalable architecture for growing user demands and facilitates ordering of goods and services.

Further Aspects and Implementation

Collaboration with health insurance and care facilities for framework understanding and funding.

Conducting **pilot projects** and studies in care facilities to test and improve the system.

Gathering **feedback** for product improvement from caregivers and seniors.

Initiating **long-term impact studies** with health insurance companies.

Adaptability to **different cultural contexts** in care facilities.

High user acceptance expected due to **intuitive operation** and **personalized interaction**.

Conclusion and Future Work



AI in elderly care is emerging, with a focus on **data security** and **ethical considerations**.

AI envisioned as a dynamic partner in healthcare, integrating with professional and familial care.

Future AI systems expected to be **more individualized, learning from interactions** for precise predictions.

Enhanced **collaboration between computer scientists, medical professionals, and caregivers**.

AI's potential while emphasizing **irreplaceable human elements of empathy** and personal attention.

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Thank you kindly for your attention!

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