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Adaptive Digital Consciousness: An Evolutionary Framework for Human Identity Preservation Using Large Language Models

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Abstract

Generative Artificial Intelligence (GenAI) and Large Language Models (LLMs) have greatly changed the interaction between man and machines through natural-language reasoning, content generation, personalization, and interaction via agents. However, traditional LLM applications do not provide a unified mechanism for maintaining a long-term, structured, and identity-consistent representation of a person during long-time interaction. As shown in the recent studies of generative agents, long-term LLM memory, agentic memory, lifelong learning, and AI self-identity, these processes present essential capabilities that have been studied as separate components. This paper presents the Adaptive Digital Consciousness (ADC) framework as the theoretical architecture for computational representation of core features of human identity. The ADC framework proposes a system of structured representation of Digital DNA for personal knowledge, experience, preferences, values, and behaviors and connects it to multilayer memory, semantic embeddings, vector retrieval, Retrieval-Augmented Generation (RAG), LLM reasoning, adaptive learning, and autonomous agents. The framework also proposes the notion of identity constraints and the system of updating memory, consolidating it, handling conflicts, forgetting, maintaining privacy, consent, and security, as well as monitoring the origin of digital information. The goal of the study is not to replicate biological or subjective consciousness

The research motivation, previous works, the system suggested, as well as memory and adaptation techniques, evaluation techniques, ethics and applications of the findings, drawbacks of the research and future research directions on this subject.

Keywords: adaptive artificial intelligence, digital identity, preservation of human identity, large language models, generation of artificial intelligence, Digital DNA technology, long-term memory and retrieval-augmented generation technology, autonomous agents and digital legacy

I. INTRODUCTION

The advent of Generative Artificial Intelligence (GenAI) and Large Language Models (LLMs) has transformed how people communicate with different software solutions. These models have the abilities to implement natural-language understanding, versatile answer generation, information summarization, reasoning, and personalization communication capabilities. The role of agents based on LLMs is important

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to this progress as it permits the incorporation of LLM with memories, planning, tools, and interaction loops.

Memory retention represents one of the key aspects of this development and Generative Agents implement the architecture of an LLM agent collecting experience and allowing the formation of high-level reflections, memory retrieval, and its use in behavior planning. In this regard, MemoryBank has continued studying long-term memory, frequent memory updates, personality changes, and selective forgetting for LLM long-term communication. More recent endeavors used the knowledge of dynamic agent memory, lifelong learning, and benchmarks of the identity permanence in language models' agents.

These developments pose a bigger question: can some of the components of someone's identity be presented in a computerized form and preserved? Here, by identity we do not mean a biological consciousness or subjective being; identity here is understood as a certain organization of data that pertains to how a person is represented in an AI, for instance, concerning personal information, past experience, tastes and interests, values, and behavioral performance. Current studies are useful for research of distinctive modules of this kind of system, but there is still no comprehensive approach to the description of the system responsible for the long-term preservation of identity.

Memory systems are concerned with the storage and retrieval of information; agent-based technologies with simulation of individuals; philosophy of education with change; and studies of identity with the research of particular characteristics related to identity formation.

1) The primary contribution of the paper is the introduction of a new conceptual framework that defines digital identity as a dynamic process instead of a static user profile. The proposed architecture integrates Digital DNA, persistent memories, information retrieval methods, LLM logic processing, adaptive updating processes, and agent collaboration.

2) The suggested framework will ensure that selected information regarding identity is preserved while still making possible the evolution of an identity in the process of information acquisition.

3) A form of template Digital DNA which is used for working with information relevant to one's identity including information about preferences, knowledge and past experience;

4) An identity-based structure that gives the possibility to apply semantic retrieval, RAG process, LLM reasoning, adaptive updating and interaction of agents;

5) The use of conceptual mechanisms aimed at memory provenance, resolving issues connected with conflicts in memory, regulated process of forgetting and maintaining the integrity of identity;

6) Evaluation system that includes measurable aspects of retrieval quality, integrity of identity and various other features.

II. PROBLEM DEFINITION AND RESEARCH GAP

An identity-preserving artificial intelligent system has to focus on a challenge that is much wider than being able to merely keep a memory of previous conversations. A good AI system has to be able to differentiate information that indicates the relatively stable identity traits of a person from the information about ephemeral experiences, to identify relevant memories, to address the problems with opposing information, and to decide when an old memory should be either updated or erased.

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The issue dealt with within this paper is connected with the lack of an all-in-one, identity-based framework which enables:

1) portray chosen components of a person's identity in an organized manner;
2) store personal data and experience for a long period;
3) recall identity-specific memories whenever necessary;
4) accept new information without getting lost in identity;
5) deal with old, unnecessary, contradictory, or false memories;
6) provide customized reasoning of LLM and agent interactions;
7) ensure confidentiality, approval, safety, source, and possessiveness and control over concerning users..

The reviewed literature suggests several related gaps.Existing work provides strong mechanisms for memory, retrieval, behavioral simulation, self-identity analysis, and lifelong adaptation, but these capabilities are not generally organized around a single identity-centered representation. For example, Generative Agents focus on believable behavior through memory and reflection [10]; MemoryBank focuses on long-term memory and selective forgetting [1]; A-MEM develops dynamically evolving agentic memory [2]; lifelong-learning research studies continual adaptation [3]; and identity-focused work proposes operational or mathematical approaches to identity persistence [4], [7]. ADC addresses the integration of these capabilities while explicitly adding governance and user-controlled identity state management.

III. RELATED WORK

A. Generative Agents and Behavioral Simulation

The team led by Park has put forth Generative Agents that combines LLM with memory stream, reflection, and retrieval facilitating real-life behavior in an interactive setting [10]. The findings show that the experiences can alter future decisions and interactions. Therefore, this serves as a basis for the application of experience memory and its retrieval by ADC. But, the agents are only simulated personalities and not living individuals which can be remembered.

B. Long-Term LLM Memory

MemoryBank's ability to retrieve long-term memory, update memory continuously, adapt personality, and selectively forget addresses the challenge of limited interactions [1]. This relates to ADC because an identity-preserving system requires more than the present conversation window to function, partial long-term storage is also necessary to be maintained and suitably altered..

C. Long-Term Retrieval and RAG

Retrieval-Augmented Generation (RAG) merges the knowledge of parametric models with an external non-parametric memory, retrieving useful data prior to generating responses [9]. In the case of the ADC, the external memory is essential because private information must be clearly stored and available for retrieval, rather than presupposed to be contained within the weights of the language model. Hippo-RAG further

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illustrates how the retrieval of information with the use of LLMs, knowledge graphs, and graph-based retrieval can merge the long-term memories [8].

D. Agentic Memory

A-MEM presents a dynamic approach of organizing memories and the creation of new memories by establishing connections with the appropriate historical memories, allowing for the evolution of a memory structure [2]. There is a close connection between this idea and the ADC requirements, according to which new experiences have to be incorporated into the computational representation of a person instead of treating every single memory as an independent record.

E. Human-Inspired AI Memory

Wu and colleagues provide a review of the memory processes in LLM systems and draw parallels with human memory systems [5]. Their review classifies memory based on different parameters such as object, modality, and duration while also identifying the unresolved issues in long-term memory systems in AI. ADC employs such concepts as a basis for its architecture while not extending its claim to the area of computation identity representation.

F. The Dimension of AI Identity and Identity Continuity

Lee develops a mathematical framework for defining and quantifying self-identity in AI systems [7]. Perrier and Bennett discuss temporal identity and continuity issues in agents based on language modeling and separate consistent identity from the process of language production that reflects the self [4]. These studies are of great importance to ADC since a system preserving identity should be monitored based on quantifiable criteria of identity stability rather than on subjective evaluations of human-like interaction.

G. Lifelong Learning

According to Zheng et al., lifelong learning of LLM-based agents consists of perception, memory, and action modules, highlighting the significance of continuous adaptation and sustaining high level of performance for a long time. Controlled adaptation is a principle applied in the context of adaptation but focused on retaining certain features of an identity and making progress in its development.

H. Agent Memory Evolution

According to Luo and his colleagues, there are three forms of memory and the development from memory to reflective memory to experiential memory which helps ADC indicate that cultural memory is not a static enclave since memories can be processed and developed into useful aspects [6].

I. Comparison With Existing Approaches

Table I contains a summary of the link between the existing methods and the proposed ADC contextual framework. The purpose of the comparison is to compare the existing contributions rather than to rank the systems. The comparison demonstrates that the ADC does not claim to invent long-term memory, RAG, agentic memory, or lifelong learning. Its contribution consists in organizing the specified mechanisms around an explicit identity state along with introducing the aspects of memory management, specifications, and digital heritage..

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Table I: COMPARISON OF EXISTING APPROACHES AND THE PROPOSED ADC FRAMEWORK

Capability	Generative Agents [10]	MemoryBank [1]	A-MEM [2]	Lifelong LLM Agents [3]	ADC (Proposed)
Long-term memory	Yes	Yes	Yes	Yes	Yes
Dynamic memory organization	Reflection/retrieval	Update/forgetting	Dynamic linking/evolution	Continual adaptation	Identity-centered evolution
Identity representation	Character profile	Personality adaptation	Memory-centered	Agent adaptation	Digital DNA schema
Identity-aware retrieval	Not primary focus	Partial	Partial	Memory-focused	Explicitly proposed
Conflict handling	Not primary focus	Limited	Memory evolution	Adaptation-focused	Explicitly proposed
Controlled forgetting	Not primary focus	Yes	Not primary focus	Continual-learning concern	Governance-aware
Identity drift evaluation	Not primary focus	Not primary focus	Not primary focus	Adaptation evaluation	Explicit metric proposed
Governance and ownership	Not primary focus	Not primary focus	Not primary focus	Not primary focus	Explicit layer
Digital legacy	Not primary focus	Not primary focus	Not primary focus	Not primary focus	Application scope

IV. PROPOSED ADAPTIVE DIGITAL CONSCIOUSNESS FRAMEWORK

A. Framework Concept

It is proposed that ADC serves as a layered structure in which an identity representation exists as a form of evolving computational state. The framework distinguishes between stable attributes of identity from changing experiences and interaction memories. It does not aim to encode an entire human being, but it keeps the identity-relevant information that has been granted permission by the individual to be retained. The processing flow that has been proposed is as follows:

Authorized Personal Data → Digital DNA → Multi-Layer Memory → Identity-Relevant Retrieval → RAG → LLM Reasoning → Adaptive Agent

There is a feedback loop through which the validated new information is sent back to the memory-management layer.

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B. Digital DNA Layer

The Central Identity Representation proposed by ADC is called the digital DNA layer. This is not the biological DNA; it does not refer to the genetic code. It is the data structure to use for representing the identity of an individual in a computable form with the necessary parameters that were defined and accepted by the user.

The definition of digital DNA is:

$$D = \{K,E,P,V,B,H,C\}, \quad (1)$$

where K is the representation of knowledge, E is responsible for the experience, P stands for the preferences of the individual, V means values, B stands for the beliefs. represents behavioral properties, H stands for interaction history, and C stands for limits imposed by identity.

The representation can contain both data as well as metadata. An identity record could consist of a data source , date and time of update, confidence level, .sensitivity level, current status of update, provenance of the data, and state of user authorizations. This way the system can distinguish a prevalent preference from a transient declaration..

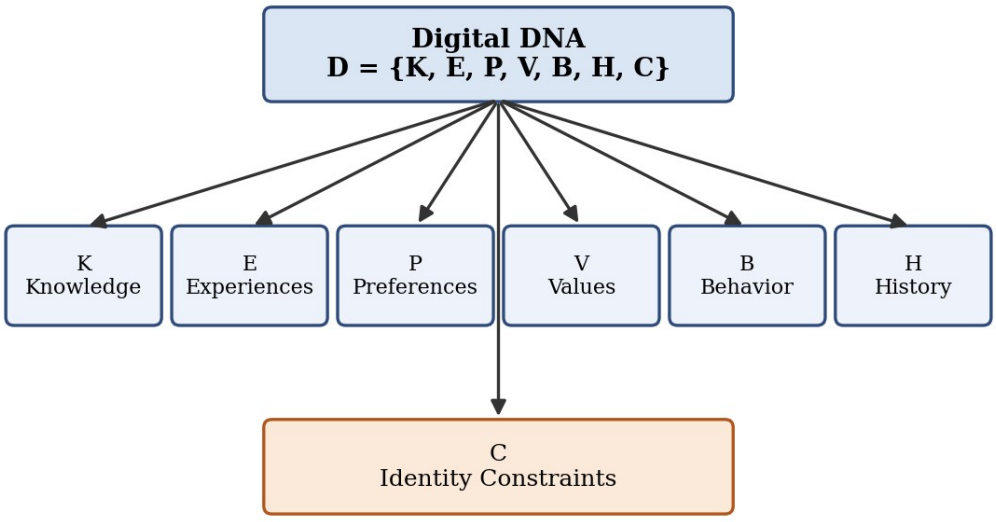


Fig. 1. Conceptual Digital DNA schema proposed by ADC.

C. Multi-Layer Memory

The idea of various memory layers is based on the principle that information related to identity is stored at various temporal and semantic levels.

Current working memory contains the information needed for the interaction taking place at present.

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Episodic memory consists of information about specific events and experience, such as interaction, decision, accomplishment, and personal event.

Semantic memory relates to a person's general knowledge that has been acquired based on the experience and has certain constant features like preferences, competences, values, and behavioral patterns.

Long-term external memory gives permanent access to information needed across sessions.

These are the memory types discussed in the given framework, although their practical implementation might include either relational databases, document repositories, vector databases, knowledge graphs, or all of them combined.

D. Semantic Embeddings and Identity-Aware Retrieval

An embedding model can convert memories into vector representations. Denote a memory item by m_i, and its embedding by $e_i = f(m_i)$. A query is denoted q and its embedding as $e_q = f(q)$. Semantic similarity is the basic quantity to determine:

$$S_{sem}(q,m_i) = (e_q \cdot e_i) / (\|e_q\| \|e_i\|) \quad (2)$$

However, the method proposed by the ADC says that identity -sensitive retrieval should also consider factors other than semantic similarity. That is, conceptual retrieval can be defined as:

$$S(q,m_i) = \alpha S_{sem} + \beta S_{rec} + \gamma S_{id} + \delta S_{rel}, \quad (3)$$

Where S_{rec} depicts the importance of time, S_{id} denotes appropriateness of identity properties or restrictions, and S_{rel} shows dependability of memory. The coefficients mentioned above are the parameters of design subject to experiments.

E. Retrieval-Augmented Generation

The personal memory fetched is provided to LLM as regulated exterior context. The process can be expressed as:

$$R = \text{Retrieve}(q,D,M) \quad (4)$$

$$y = \text{LLM}(q,R,C), \quad (5)$$

where D stands for Digital DNA, M refers to persistent memory, R represents retrieved context, C is for identity constraints, and y symbolizes response generated.

The differentiation is necessary as personal memory remains an established level of data. LLM is considered part of reasoning and generation, not treated as permanent data storage for individual's identity.

F. LLM Reasoning Layer

The LLM gets the latest question and relevant identity context as well as memories that it has retrieved. It interprets the current communication, reasons with the retrieved information and delivers an answer in compliance with the identity representation available.

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The framework does not presume that the LLM has the identity of the user, i.e. identity consistency is an architectural feature that comes as a result of controlled combination of identity data, memory retrieval, constraints, and generation.

G. Adaptive Learning and Identity Update

The objective of the use of ADC is for it to evolve along with newly encountered experiences. Importantly, this does not mean that a new interaction will immediately translate into a permanent identity characteristic. The framework proposes the following adaptation pipeline:

New Interaction → Candidate Memory → Validation → Conflict Management → Update / Synthesis / Cancellation → Identity State Update

A candidate memory is assessed based on the credibility of its source, its frequency, timeliness, congruency with known information, and the verification by the user.

For example, if a user reports once that there has been a change in his temporary preferences, the system does not need to instantly change a stable identity trait. Often, there will be a need for either a repetition of the evidence or a distinct confirmation by the user for the change to be accepted..

H. Control of identity consistency and drift.

Identity consistency is a core requirement of Identity-based Technology. Let I_t represent the identity at time t. After the input of new information x_t, the identity is updated as follows:

$$I_{t+1} = U(I_t, x_t, G_t). \quad (6)$$

The aim of the framework is to observe changes by means of the following formula:

$$\Delta I = d(I_t, I_{t+1}), \quad (7)$$

but it is still known that the evolvement should be legitimate. Hence, if ΔI is low, this does not imply its good nature because, due to the changes, people can change as well. Thus, the evaluation should separate genuine evolvement from improper identity drift.

I. Memory Conflict and Outdated Information

Conflicting memory can arise when a new piece of information contradicts an existing memory. According to ADC theory, rather than overwriting one of the memories, the memory system should maintain provenance and compare:

- the source and reliability of information;
- the timestamp;
- the frequency;
- the explicit corrections made by the user;
- the context; and
- the reconciliation with other memory records.

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The outcome of the various comparison processes may lead to preserving both memories in the system, replacing the older memory record, flagging the old memory as obsolete, asking the user for confirmation in regard to the record, or deleting it according to the authorized policy of forgetting.

J. Controlled Forgetting

Forgetting is understood as a process of governing memories instead of being the association of the term with blind deletion. A memory may become out of date, superfluous, wrong, or not needed anymore. The mathematical concept of retention has a basis in the following equation:

$$R_m=f(A_m,T_m,C_m,U_m), \quad (8)$$

where A_m denotes importance, T_m - temporality, C_m - reiteration, and U_m is the reference to user authority. The actual function in the equation represents a research question.

K. Autonomous Agent Layer

The agent layer provides the interaction interface through which the identity representation is used. The agent can retrieve memories, reason over them, generate responses, and initiate authorized actions. The agent must remain bounded by identity constraints and governance rules.

The architecture therefore separates adaptation from unrestricted autonomy. An agent can use stored identity information, but persistent changes to the identity state should pass through the memory-management and governance mechanisms.

L. Governance Layer

Persistent identity data has associated risks, so ADC employs several measures to ensure safety such as the requirement for user consent, implementation of access control measures and data minimization practices, as well as using encryption and safe storage; maintaining provenance and auditability of the process; enabling correction of inaccurate data by the user; ensuring the ownership and portability of data; and creating rules for postmortem access to the data.

Governance layer is essential part of the proposed identity architecture as the utility of persistent identity depends on how securely and effectively its data is managed.

V. PROPOSED SYSTEM WORKFLOW

The proposed ADC workflow is divided into eight stages.

A. Stage 1: Setting Up Identity

In this stage, the person inputs official data including knowledge, choices, standards, past experiences, and dispositions. The system converts these inputs into the Earth's first Digital DNA model.

B. Stage 2: Memory Formation

In this stage, modern information is processed and structured into records and semantic concepts. Metadata such as time, origin, confidence, privacy, history, and approval is added.

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C. Third Stage: Long-Term Preservation.

Identity data are stored separately from vector representations, thereby enabling handling deterministic attributes and semantic memory through appropriate storage techniques.

D. The Fourth Stage: Retrieval Process.

When a new request comes, the system detects it based on the semantic and identity-aware ranking based on relevant knowledge and identity characteristics and retrieves the relevant memory.

E. The Fifth Stage: Context Creation.

The retrieved memory gets filtered and organized into a limited context. In cases where conflicting information or low confidence is present, the relevant information will be excluded or flagged.

F. The Sixth Stage: LLM Reasoning Process.

The LLM gets the user query and processes it together with the retrieved response context and identity constraints.

G. Step Seven: Reaction and Interaction Among the Parties

The agent issues a personalized reply or an actionable step in compliance with a specific aspect of identity representation without constructing a memory.

H. Step Eight: Modification of Memory

The interaction is analyzed as a potential new memory. Based on the trustworthiness, value, presence of a dispute, and user preference factors, the memory can be either saved, processed, updated, or discarded.

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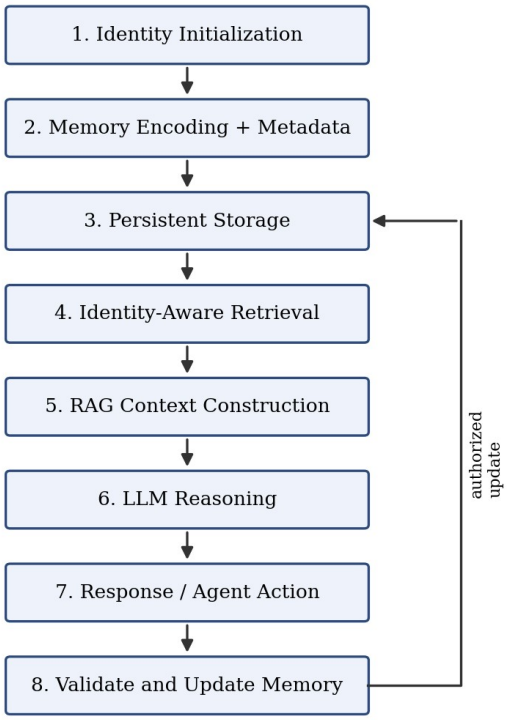


Fig. 2. Proposed ADC workflow from identity initialization to validated memory update.

VI. SYSTEM ARCHITECTURE

As demonstrated by the architecture in Fig. 3, the LLM does not represent the only means of memory. Other components of the model, including the identity representation component and memory layers, provide an important external permanent state. Moreover, retrieval allows one to determine which elements of the state are connected with the instant interaction, while governance limits access to the information as well as to the identity transformation.

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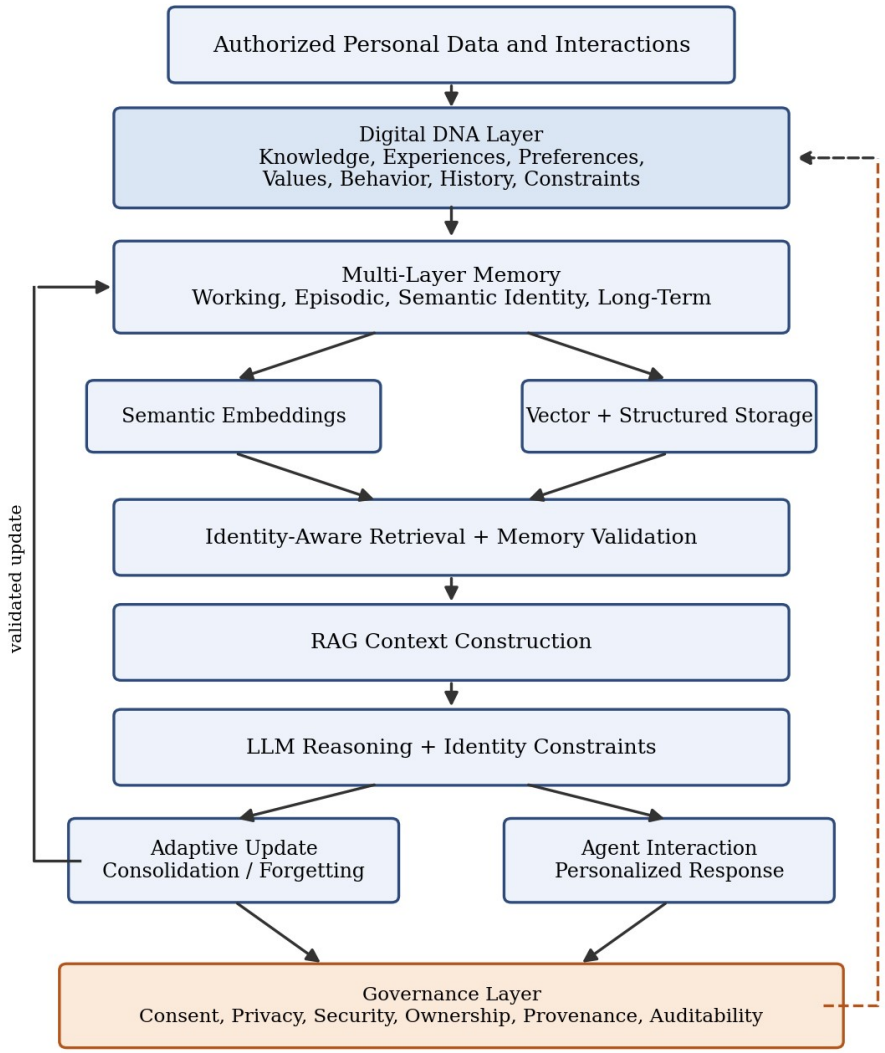


Fig. 3. Conceptual ADC architecture for persistent and evolving computational representation of selected aspects of human identity.

VII. METHODOLOGY

The research employs a design-based approach.

A. Literature Review

The relevant literature has been identified within four fields: LLM memory, generative agents, identity modeling, and lifelong/agentic adaptation. The goal is to discover approaches that may help preserve identity, without treating any existing system as equal to ADC.

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B. The design of the identity schema

A structured schema of Digital DNA is established, and this schema incorporates all such vital factors as personal knowledge, personal experience, personal preferences, personal values, behavioral characteristics, interaction history, and identity constraints.

C. Design of the memory architecture

The model incorporates the concept of the memory layers and defines the metadata that is needed in order to ensure the persistence of the information, to retrieve it, to update it, to consolidate it, to solve cases of conflict, or control the process of forgetting.

D. Design of the process of retrieval andRAG

Both the concept of covert semantics and the idea of retrieval based on vectors are utilized together with identity relevance and identity reliability.

E. Design of the adaptive update

The process of memory update is employed to analyze new interactions before making the change in the attitudes toward identity in the context of Digital DNA.

F. Designing Interactions of Agents

When making use of progressives agents, an agent makes use of its representation of identity, as well as the memories it has gotten, and its interactions remain subject to identity and governance constraints.

G. Design Governance

The components of compliance, privacy, security, ownership, and auditability, as well as control of users, are part of the design.

VIII. EVALUATION METHODOLOGY

The paper does not assert any experimental performance finding as ADC is considered as an idea. The future prototype should be able to evaluate at least 3 configurations, namely (1) an LLM without habitual personal memory, (2) an ordinary RAG or memory-enhanced baseline and (3) the proposed ADC model. The idea is to see if the methods of retrieval based on identity and memory have any beneficial impact on outcome of the study.

Table II: PROPOSED EVALUATION METRICS FOR ADC

Dimension	Proposed Metric / Evaluation Method
Memory retrieval	Precision@K, Recall@K, MRR, and retrieval relevance
Identity consistency	Consistency rate across repeated identity queries
Personalization	Human relevance rating and preference agreement
Adaptation stability	Valid-update rate and inappropriate-update rate
Identity drift	$\Delta I = d(I_t, I_{t+1})$ with expert/user judgment

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Dimension	Proposed Metric / Evaluation Method
Conflict handling	Conflict detection rate and correct resolution rate
Controlled forgetting	Authorized deletion success and residual-memory rate
Reliability	Unsupported-memory rate and provenance coverage
Governance	Unauthorized-access rate and policy-compliance rate

A. Memory Retrieval Performance

The benchmark may include queries to which answers are given by known personal memories. Metrics of accuracy of retrieval may include precision, recall, Mean Reciprocal Rank (MRR), and human judgments.

B. Identity Consistency

The evaluation of repeated interactions should use a controlled identity profile. It should differentiate between valid changes and improper contradictions introduced by the user.

C. Personalization Evaluation

The validity of responses can be assessed by contrasting them with responses produced without memory. The results can be evaluated by humans to verify the correctness of the context.

D. Adaptation Stability

The system can be presented with a new sequence of information including temporary preferences, absolute changes, contradictions, and noise.

E. Identity Drift

Identity drift should not be defined simply as any change. A useful evaluation should compare system updates with an authorized ground-truth change set. The difference between authorized changes and system-induced changes can then be used to identify inappropriate drift.

F. Dealing with Memory Conflicts

Test scenarios ought to involve conflicting information, outdated data, duplicate memories, and low-security information. The application needs to recognize these cases and implement its update protocol.

G. Regulated Forgetting

Forgetfulness tests should include authorized deletions as well as outdated-memory situations. The test will determine whether the deleted information can be recovered through direct retrieval, generated outputs, or related summaries.

H. Privacy and Governance Assessment

Future prototypes should be examined for unauthorized access, inadvertent memory exposure, incorrect deletion procedure, absent consent, and inadequate provenance or audit logging.

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IX. DISCUSSION

The communication that occurs comes as a result of multiple devices being integrated. The uniqueness of the methods is not that these technologies are new; it is actually the connection of already existing technologies with the aim of solving a particular challenge.

For abstracting identity, there is Digital DNA layer. There is multi-level storage, which means that the information will be kept for a long period of time. In addition, embedding enables the retrieval of only necessary information. The LLM allows to interpret the information and produce it again. Adaptive approaches provide constant change of technologies.

One essential principle in design is in connection to identity: identity should be seen as a developing fact of provenance, not as an unchangeable profile. This helps the system to adopt legitimate personal changes and simultaneously diminishes the chance of any unintended changes. This distinction is important, as too much stability might block legitimate changes, while too much freedom might lead to identity drift.

ADC makes an important distinction between preserving identity and representing consciousness. A system can preserve information about a person and react based on that information, but without the ability to experience things. In this regard, ADC uses the term “digital consciousness” for the proposed model, while simultaneously limiting the technical aspect to identity representation.

X. POTENTIAL APPLICATIONS

A. Personalized Long-Term AI Assistants

An ADC-based assistant could maintain authorized preferences, recurring tasks, knowledge, and interaction history across long periods.

B. Adaptive Digital Companions

The usage of long-term memory together with identity-aware communication may usher the era of personalized digital companions.

C. Digital Legacy Storage

In the case of obtaining explicit permission as well as governance, different knowledge, experiences, preferences, and values can be kept as part of digital legacy storage.

D. Inter-generational Knowledge Transfer

Approved memories as well as personal knowledge can be organized for the use of future family members or communities through the transfer of knowledge.

E. Personal Knowledge Management

ADC can become a universal knowledge management system which is based on the importance of the identity of a person.

XI. ETHICAL, PRIVACY, SECURITY, AND OWNERSHIP CONSIDERATIONS

Identity-preserving AI systems generate risks that differ from those of conventional conversational AI systems due to their reliance on the continued existence of personal data.

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First, consent for the use of this data should be given explicitly. The subject must choose what data to enter, how to utilize it, and whether to share it.

Second, minimization of data must be applied, i.e., the system should keep only data that is essential for the identity representation process.

Third, security is vital because a permanent identity data base usually contains sensitive information about people. Security measures that may be applied at the implementation stage include access control, encryption, audit logging, provenance protection, and secure deletion of the data.

Number four is identity impersonation and harmful memory modification, which are critical risks. If an adversary can get their hands on or change the identity representation, the system may issue unattainable or erroneous output as if from the person whose identity is being misrepresented.

Number five is property and portability. Individuals must possess substantial control over the representation and the right to examine or change significant records about one's identity.

Last but not least, digital inheritance and post mortem usage need to be clearly stated in policies. The technical platform will not determine any legal rights or moral considerations on its own because they must be assigned according to the context of use and relevant laws.

XII. LIMITATIONS

The proposed framework has several limitations.

1) ADC is a theoretical model and must be put into practice and verified with the use of experiments.
2) Digital DNA is an innovative model that needs to be clarified and supported by experimentation involving users.
3) The notion of identity consistency cannot be based exclusively on natural language generator fluency.
4) LLM hallucination, errors in data retrieval, biased sources of information, and incorrect modifications of memory may affect digital identity representation.
5) The notion of human identity is complicated and cannot be expressed wholly in a limited computational model.
6) A computational model of identity does not imply the existence of any biological consciousness or subjective experience.
7) The issues of long-term storage and retrieval may result in financial, logistical, and safety problems.
8) A digital legacy policy is a combination of user consent, legal framework, and governance issues, except for the LLM itself.

XIII. FUTURE RESEARCH

The future course should involve the construction of an ADC system prototype and long-term assessments of it. The research needs to be aimed at formalizing the Digital DNA schema, implementing identity-aware retrieval methods, providing reliable memory conflict resolution solutions, and controlling the process of forgetting.

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Experiments may be structured to compare an LLM with no memory and a standard memory/RAG system with an ADC system based on the same interaction sequence. The evaluation should involve such criteria as retrieval quality, identity consistency, personalization, authorized adaptation, identity fluctuations, conflict resolution, effectiveness of deletion, and compliance with governance.

Future research may involve knowledge graphs, multimodal personal memories, tracking the origin of data, memory management systems for users, and planning of adaptive agents. Long-term user research may be crucial for this area as the issue of identity preservation is time-related.

XIV. CONCLUSION

In this paper, a new framework called Adaptive Digital Consciousness (ADC) is introduced as a theoretical model for preserving and developing particular aspects of human identity using advanced digital technologies based on GenAI and LLMs. The framework incorporates the representation of Digital DNA, several-layer memories, semantic embeddings, and vector storage, along with features providing retrieval based on the identity and adaptive learning.

The primary research problem is the broken connection between long-term memory, identity modeling, adaptive agents, and individual interactions. ADC combines these elements around an identity-centered structure, a mechanism designed for storing and retrieving information, and reminding a person about the identity they represent.

However, ADC makes no claims about being able to recreate biological or subjective consciousness. Its purpose is to create a computational mechanism for representing digital identity in a sustainable and evolving manner. The proposed evaluative approach gives grounds for practical testing memory retrieval, consistency of identity, ability to adjust, ways of conflict resolution, forgetting, and management of the new identity. A validated implementation of the framework would provide a basis for stronger statements on practical applicability in the area of the digital identity.

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