RemiGraph: An Interactive Memory Graph for AI-Guided Life Journaling and Reminiscence Support

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Abstract

Regular journaling supports autobiographical memory, anchoring identity and aiding future dementia care. We introduce RemiGraph, a system that enhances journaling with AI-generated question prompts, pairing it with an interactive memory graph that maps life events and patterns. The system aims to deepen self-reflection and give caregivers a clear view of a dementia patient's life-log to support meaningful reminiscence therapy. In a pilot study (n=8), AI prompts boosted engagement and journal entry word count, while a walkthrough study with five therapists indicated RemiGraph's potential to aid patient familiarization and enrich therapy. These findings position RemiGraph as a bridge between everyday journaling and dementia support.

CCS Concepts

• **Human-centered computing** → **Interactive systems and tools**.

Keywords

Reminiscence therapy, dementia, memory graph, LLM, journaling

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1 Introduction

Autobiographical memory forms the narrative backbone of identity, enabling us to define who we are through reflection on past experiences [6, 29]. Its loss, particularly through dementia, undermines well-being and selfhood [20]. While pharmacological treatments may alleviate symptoms, they do not halt disease progression [2, 28, 31]. This highlights the importance of non-pharmacological interventions that preserve cognitive function and quality of life.

Journaling has been shown to enhance autobiographical memory by strengthening memory traces through reflection [19]. Reminiscence Therapy (RT) is a structured form of assisted journaling that uses props and guided questions to help persons with dementia (PwD) recall life experiences [3, 33]. RT has been linked to improved mood, reduced depression, and a reinforced sense of self [10, 13, 17, 18, 30], with potential to slow cognitive decline [12, 13, 30]. RT's effectiveness relies on the caregiver's familiarity with the PwD's biography and RT guidelines. However, caregivers rarely receive RT training [15] and often meet the PwD after dementia onset [8, 16]. To address this, we introduce RemiGraph, a journaling system that pairs AI-generated prompts with a visual "memory graph" mapping key life events. This dual function supports memory reinforcement in the present and equips future caregivers with an at-a-glance life history to personalize RT. We present results from two pilot studies: one demonstrating how AI prompts increase engagement and detail in journaling, and another showing how caregivers perceive the system as useful for building familiarity and guiding RT. Our work builds on systems like MemPal [21], Resonance [34], and prior RT technologies [4, 5, 14, 23], highlighting RemiGraph's unique focus on bridging reflective practice today with dementia support tomorrow.

2 System Design and Features

RemiGraph is a webapp for AI-assisted journaling grounded in RT. Our system transforms unstructured life-logs into a visual graph representation of autobiographical memory.

Memory Graph Generation. Our "memorify" pipeline converts free-form text and seeded data into a structured graph. Page-length segments are passed to GPT-4o, using a 128k-token window to extract themes, entities (people, places, dates, objects), and event-level memories in JSON format via Pydantic schemas. Entities are merged into a growing graph, reusing nodes for recurring items to maintain a unified life-log. Following Tulving's episodic–semantic distinction [32], each memory stores what, where, when, and who, linking to shared entity nodes with semantic metadata (e.g., name,

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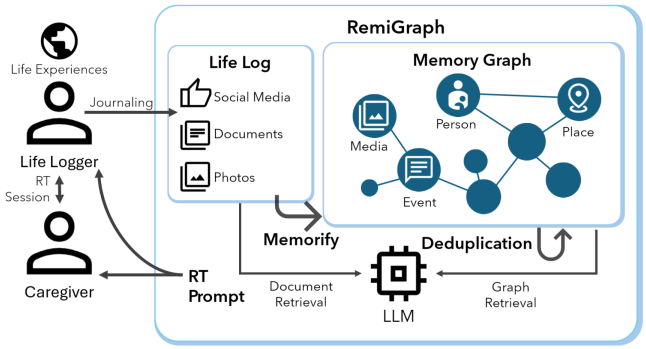

Figure 1: The RemiGraph System builds a memory graph from a user's life-log seeded by photo libraries or social media data. The web interface enables interactive navigation and update of the memory graph while entity deduplication helps keep the graph compact and accurate.

relation). The LLM extracts precise dates and tags life stages (e.g., childhood, early adulthood) for temporal alignment. The web interface allows users to recenter the view by clicking nodes, toggle entity types (e.g., hide places), and review summaries with photos. Caregivers can filter by past session dates to revisit relevant memories. To resolve identity overlap (e.g., "Grandma" vs. "Esther"), RemiGraph prompts the LLM to generate short profiles (name, relation, shared experiences), embeds them, and uses cosine similarity to flag duplicates. Users approve merges, after which edges are consolidated and summaries updated to maintain a compact graph.

Prompt Generation. RemiGraph generates personalized, open-ended question prompts to support journaling or caregiver-led reminiscence sessions. Guided by RT principles, the system acts as a "compassionate reminiscence assistant," designed to evoke fond memories using simple, respectful language while avoiding distressing topics. Built on a retrieval-augmented generation (RAG) pipeline, it embeds life-log text chunks into a vector database (ChromaDB). When journaling or reviewing a memory, the system retrieves top-k similar chunks via cosine similarity and feeds them to GPT-4o to craft context-aware prompts (e.g., "What sounds do you remember from that day?") or suggest connections to related memories. Caregivers can also select any graph node (e.g., "COVID-19 Pandemic," "Mike") to receive tailored questions. RemiGraph builds a user's life-log from scratch, seeding it with data from digital journals, photo libraries (e.g., iCloud), or social media (e.g., from Instagram using InstaLoader). Images, known to enhance autobiographical recall in RT [24], are processed through a multimodal LLM that generates text summaries based on visual content and journal context. These are embedded and stored with links to the original files. During journaling or RT, the system retrieves relevant summaries and surfaces matching images to enrich reflection.

3 Evaluation

We conducted two pilot studies to evaluate RemiGraph: one with general users (Study 1) and one with dementia caregivers (Study 2). In Study 1, eight participants (ages 17–63, 4F, undergraduate to graduate degree, no dementia) were randomly assigned to either a Dynamic group (n=4), which received personalized, LLM-generated prompts based on their journal entry, or a Static group (n=4), which received fixed reflective questions. Participants first completed the SRI Scale [11], then watched four short first-person videos simulating everyday experiences [22]. After each video, they wrote journal entries (up to 10 minutes), receiving either static or dynamic prompts. Post-task, they completed the SAM questionnaire [26] and UE Scale [25]. We measured recall detail using an entity score, comparing participant memory graphs to a ground-truth graph derived from the video scripts. Points were awarded for accurate recall of people, places, objects, and events, with partial credit for minor errors and bonus points for correct unlisted details. Scores were normalized to 100. We also measured written engagement via word count as a proxy for memory richness [1, 9, 27].

In Study 2, we evaluated RemiGraph's perceived usefulness among five professional dementia caregivers recruited via Prolific. Participants had 1 to 5+ years of experience and had worked with 3 to over 10 persons with dementia (PwD), conducting reminiscence therapy (RT) from daily to weekly. After completing a survey on RT challenges, participants viewed a RemiGraph demo and responded to both the Perceived Usefulness and Ease of Use questionnaire [7] and open-ended system-specific questions.

3.1 Study 1 Results and Discussion

The Dynamic prompt group outperformed the Static group in both recall and engagement. Although baseline memory scores were nearly identical (0.65 vs. 0.66), the dynamic group achieved 9% higher entity scores across people, places, objects, and events. Participants with dynamic prompts responded to an average of 6.5 prompts, twice as many as the static group, and wrote significantly more (277 vs. 150 words per video). These prompts elicited richer reflections, such as naming specific friends at a bonfire or describing crossword habits, with the system following up with subsequent related prompts. The results indicate support for our hypothesis that personalized prompts enhance journaling depth and user engagement. While we cannot confirm a direct improvement in memory recall, the increased specificity suggests an indirect effect through deeper engagement. One participant's response to the prompt "What sounds or smells remind you of happy times?" recalled the scent of rice and memories of their grandmother, unrelated to the stimulus video but emotionally significant.

3.2 Study 2 Results and Discussion

Key challenges identified by participants in current RT practice included lack of patient background, time-consuming prep, and risk of triggering distress. One caregiver noted, "*Without that personal history, it's hard to have meaningful conversations.*" RemiGraph received high ratings, 6.33 for usefulness, and 5.93 for ease of use on a 7-point scale, and was praised for organizing patient histories, reducing prep time, and offering relevant prompts. As one caregiver put it, "*[RemiGraph] supports caregivers by reducing preparation time and offering relevant prompts… This allows caregivers to focus more on meaningful interaction rather than searching for materials.*" Others highlighted its value for novices, saying "*Starting reminiscence therapy with someone new can feel a bit awkward... [RemiGraph] would help me start conversations that actually resonate with them,*

instead of just guessing." Another described it as "*a little cheat sheet to get the conversation going*." Overall, feedback suggests RemiGraph has the potential to meet real needs in RT by easing logistical burdens and helping caregivers focus on empathy and connection, with value for both novice and experienced users.

4 Conclusion

While our pilot studies show promising results, they are limited by small sample sizes, simulated memories, and the lack of real-world deployment. Future work will address these through long-term studies with PwD and caregivers, and system additions such as timeline views, memory change tracking, improved prompt contextualization, AI-powered metadata integration, and passive life-logging. Overall, RemiGraph offers a novel approach to preserving autobiographical memory by turning journals into a structured memory graph. Early results suggest that AI-guided prompts deepen reflection, and caregivers see strong potential for enhancing therapy preparation and patient connection, pointing toward a promising tool for supporting memory, identity, and care in dementia.

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