DESIGN OF A COGNITIVE MEMORY FOR SOLDIERS

SRIMAN.K, B.AMUTHA

Abstract: Human memory system is classified in to long term memory [LTM] and short term memory [STM].Long term memory consists of life time memories which go deep in to the brain. Short term memory consists of day to day activities. Examples include yesterday's dress; food had today, study of poem etc. The problem areas for memory have been identified as birth, heredity, sudden accident, mental depression, loss of close relatives, and loss of property which the people like much.
In order to overcome the problem of memory loss or inactive memory cells the brain information is collected and stored separately in a memory cloud system. Later when ever required these stored images or values are used to regenerate the necessary details to support the brain activities to function normally by igniting the brain cells that are not active with the help of sensor. Thus with the help of this technology we can regain the lost details from the memory to the soldiers.

Keywords : short term memory, long term memory, memory loss, sensors, memory cloud.

Introduction : The human dimension encompasses the moral, physical, and cognitive components of Soldier, leader, and organizational development and performance essential to raise, prepare, and employ the Army in full spectrum operation. This definition recognizes that Soldier readiness—everything from training proficiency to motivation to well-being—is fundamental to the Army's future success. It introduces the concept of holistic fitness, a comprehensive combination of the whole person including all components of the human dimension triad. The human dimension definition also acknowledges that war, notwithstanding the inevitable changes in the purposes, ways and means, will remain a savage clash of wills.

The human dimension concept is unique among Army concepts not only in its subject matter, but also in its organization. It begins with the operational problem and a discussion of a future of persistent conflict, identifying trends that will affect the human dimension in both the global and domestic operational environments (OE). It continues with a discussion of the Army as a profession and of the future challenges facing Soldiers including members of the Army family.

Pattern recognition remains an elusive art, even after decades of work by thousands of people in the field worldwide. Some progress has been made. You can now phone an airline company, talk to a computer, and make a flight reservation. There are other examples of practical applications of current methodology, but they all exhibit far from human-like capability.

Humans and animals are superbly capable complex machines, not possessing supernatural powers. Believing that, we try to understand the mechanism, the action that takes place when we are seeing and hearing, and in particular, how we recognize patterns.

This technology contemplate a memory of enormous, almost unbelievable capacity, enough to hold many lifetimes of stored visual, auditory, tactile, olfactory, vestibular, etc. Data and patterns are retrieved in response to an input pattern, whether visual, auditory, tactile, etc. or a combination. The input pattern serves as a prompt to initiate retrieval of data patterns related to the prompt, if they are stored in the memory. If data patterns are retrieved and if they contain identification, the input pattern is thereby identified.

It is surprising that many aspects of human mental activity can be explained by such a simple idea of memory. Some of these aspects will be described below. On the engineering side, we will introduce new approaches to computer memory, to pattern recognition, and to control systems.

Related Work : Cognitive Memory: Human and Machine describes about methods used to build an artificial memory system similar to human memory and how to use this system to solve practical problems. The author uses pattern recognition for retrieving information from the artificial memory. The "cognitive memory" proposed in this paper is of a unique design that could be physically built to give a computer a "human-like" memory. The memory system is divided into segments. Each segment has a set of memory folders capable of storing visual auditory, tactile, olfactory, etc. patterns. Each segment has its own auto associative neural network for handling storing and retrieval of information [1].

A Contextualized Cognitive Perspective for Linked Sensor Data" Myriam Leggieri, described that a context-awareness approach to sensors, proposing a first extension of sensor ontologies in contextual cognitive direction. Their proposal aims at emulating the human cognitive ability, taking advantage of Linked Data, in order to improve the human understanding of reality through sensors [2].

Cognitive task analyses for decision centred design and Training" three case studies of Cognitive Task Analysis (CTA) for defining systems design and training requirements. The approach taken involves a modification of the critical decision method of Klein et al. The authors utilized the revised CDM to obtain information from expert white-water rafting guides, general aviation pilots, and emergency ambulance dispatchers. The information obtained was used to develop multi-media tools for training rafting guides and general aviation pilots, and to redesign the VDU display requirements for the ambulance dispatchers [4].

A cognitive model of human thinking" explained about the findings in brain organization and cognitive neuroscience, proposed a more low-level and plausible architecture of **human** cognition, called CAUT. Comparing with existing **models**, three changes are made: (1) a pathway called inner loop is added from motor controller to thalamus; (2) a **memory** controller is added in front of long-term declarative **memory**, which can judge whether the **memory** operation is retrieval or not; (3) two new modules, Active Object buffer (AO) and Active Action buffer, are separated out of the general working **memory model**. With CAUT architecture, a dynamic cognitive **model** is put out with which typical thinking processes can be interpreted and described more precisely [6].

Cognitive Activities Required For Soliders

The cognitive activities of human dimension consists of the critical competencies required of Soldiers in the future and the processes and tools needed to build those competencies. The cognitive activities complements the moral and physical activities. It is about learning, thinking, and application. Future Army training and leader development will be Soldier-centered, modular, and integral to effectiveness of the operational force, providing far greater flexibility and precision in the training and development of Soldiers throughout their military careers. An understanding of future Soldier learners and future learning, as well as characteristics of the future OE necessitates a transition to a more Soldier-focused training and leader development approach.

A. Implications of Future Changes on Training and Leader Education

1) Future learners and learning

Future learners will share many of the needs and preferences of today's adult learners but may also possess unique qualities with implications for Army training and education. The Millennial will have the greatest influence on the Army learning environment. Millennial know all things digital, having grown up immersed in computer games, MP3 players, DVDs, digital video recorders, cell phones, and the Internet. Some suggest that the brains of this "digital generation" are different from previous generations and that they manifest these differences cognitively. Some predict that future learners will prefer independent learning experiences and have a natural affinity for self-development and lifelong learning, and prefer collaborative learning experiences.

2) Operational implications—knowledge future Soldiers will need

In the anticipated future era of persistent conflict, Soldiers of all ranks and specialties will have to be intellectually agile. The Army will have to train a broader range of skills in its schools, training centers and units while available training time is unlikely to increase. The balance between specialty skills and common warrior skills will remain important.

3) Balancing Soldier competencies, skills, knowledge, and abilities

The skill demands on future Soldiers are hard to overestimate. Leaders at all levels must do mission planning and make decisions previously handled at higher echelons. Highly complex decision making under severe time constraints will be the norm. Soldiers performing critical tasks outside their branch must somehow maintain proficiency on core tasks. All of these factors drive the need to expand the skill sets of individual Soldiers while increasing collective capability. The Army must consider many factors to determine the best mix of core, leader and specialty skills for Soldiers and leaders at different levels, and the best mix of those skilled individuals in teams, units and larger organizations.

B. **How information is stored in human brain**

The information flows through the neural circuits and networks of the brain, the activity of the neurons causes the connection points to become stronger or weaker in response. The **strengthening and weakening of the synapses** is how the brain stores information.

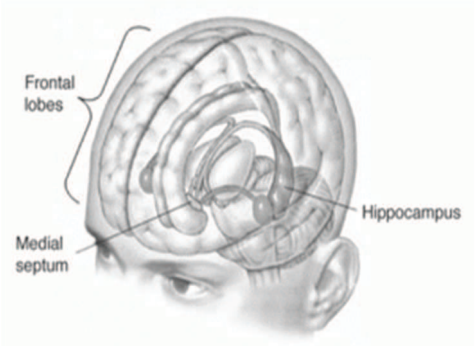

Fig 1: Hippocampus location

hippocampus is a region of the brain that is specialized to codifying and structuring memories, particularly autobiographical and episodic memories (memories about people, places, and events).

However some scientists believe that memories are only held in the hippocampus temporarily, and are later re-coded and dispersed throughout the rest of the brain using a process called "memory consolidation," which may happen during sleep.

Long-term memories and behavioral skills are stored broadly throughout the brain using a "distributed representation" which is both highly redundant and highly efficient.

Short-term memory appears to work completely differently. A phone number can be remembered instantly, but forgotten just as fast. Repetition of experience, such as reciting a phone number, is one of many ways that memories migrate from short-term memory to longer-term systems. The most popular view on short-term memory is that it results from signaling patterns circulating in "recurrent feedback loops" within neural circuits on the scale of a 1 millimeter or so of brain tissue.

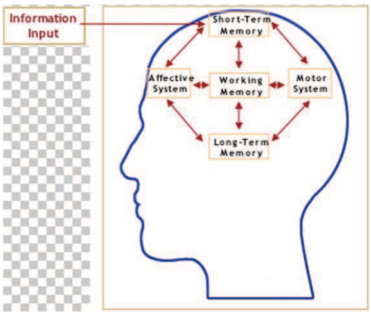

Fig 2:Diagram of information processing

1) Diagram of information stored in different areas of brain

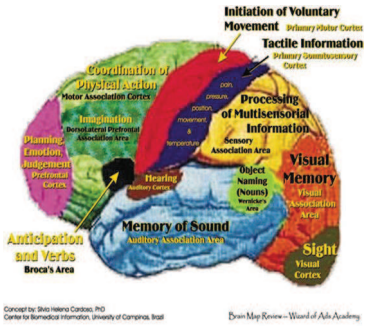

Fig 3: Information stored in brain

The above figure 3 shows how various kinds of information are stored in different location or different parts of human brain. Such as pain, pressure etc are stored in sensory portion of brain, anticipation and verbs are stored in broca's area etc.

2) Timing units between memory recall

Recall or retrieval of memory refers to the subsequent re-accessing of events or information from the past, which have been previously encoded and stored in the brain. In common parlance, it is known as remembering. During recall, the brain "replays" a pattern of neural activity that was originally generated in response to a particular event, echoing the brain's perception of the real event. These replays are not quite identical to the original, though - otherwise we would not know the difference between the genuine experience and the memory - but are mixed with an awareness of the current situation.

The efficiency of human memory recall is astounding. Most of what we remember is by direct retrieval, where items of information are linked directly a question or cue, rather than by the kind of sequential scan a computer might use (which would require a systematic search through the entire contents of memory until a match is found). Other memories are retrieved quickly and efficiently by hierarchical inference. The three main types of recall are free recall, cued recall and serial recall.

Conclusion

In this paper, a memory cloud system is going to be designed to store the information which human brain stores. The information or data is collected and stored into cloud exactly at the time it is stored in human brain. If ever any memory loss occurs, this cloud system is used to provide the lost information with the help of biological sensors to that soldier. These biological sensors are used to ignite the brain cells that are not active and there by solve the problem of memory loss in soldiers.

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Department of Computer Science, SRM University, Kancheepuram, India.