

Spiking Neural Network

A Seminar Report

submitted by

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PKD19CS046

to

the APJ Abdul Kalam Technological University

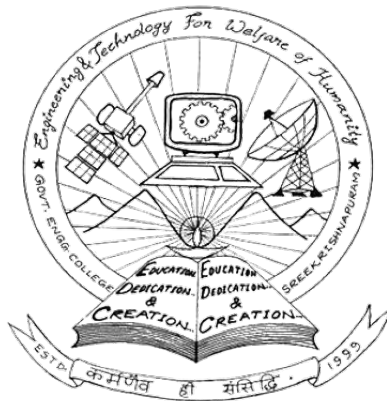
in partial fulfillment of requirements for the award of degree

of

Bachelor of Technology

in

Computer Science and Engineering



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

GOVERNMENT ENGINEERING COLLEGE PALAKKAD

SREEKRISHNAPURAM 678 633

DECEMBER 2022

**DEPT. OF COMPUTER SCIENCE ENGINEERING GOVERNMENT
ENGINEERING COLLEGE PALAKKAD**

2022 - 23



CERTIFICATE

This is to certify that the report entitled **Constructing an Associative Memory System Using Spiking Neural Network** submitted by **SANKAR VINAYAK E P** (PKD19CS046), to the APJ Abdul Kalam Technological University in partial fulfillment of the B.Tech. degree in Computer Science and Engineering is a bonafide record of the seminar work carried out by him under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

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DECLARATION

I SANKAR VINAYAK E P hereby declare that the seminar report **Constructing an Associative Memory System Using Spiking Neural Network**, submitted for partial fulfillment of the requirements for the award of degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of Liji L Dominic

This submission represents my ideas in my own words and where ideas or words of others have been included, I have adequately and accurately cited and referenced the original sources.

I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

Sreekrishnapuram

15-12-2022

SANKAR VINAYAK E P

Acknowledgement

I take this opportunity to express my deepest sense of gratitude and sincere thanks to everyone who helped me to complete this work successfully. I express my sincere thanks to **Dr. Sabitha S**, Head of Department, Computer Science and Engineering, College of Engineering Sreekrishnapuram for providing me with all the necessary facilities and support.

I would like to express my sincere gratitude to **Dr. Swaraj K P** and **Prof. Seminar coordinator 2**, department of Computer Science and Engineering, College of Engineering Sreekrishnapuram for their support and co-operation.

I would like to place on record my sincere gratitude to my seminar guide **Liji L Dominic**, Assistant Professor, Computer Science and Engineering, College of Engineering for the guidance and mentorship throughout the course.

Finally I thank my family, and friends who contributed to the successful fulfilment of this seminar work.

SANKAR VINAYAK E P

Abstract

Associative memory is a concept widely used in the cases in which the memory needs to be accessed based on the content. A spiking neural network is a special type of neural network which simulates the biological neural network. Combining these two concepts can result in an effective memory representation technique in which the contents can be accessed with speed and efficiency. The report provides an overview of the principles of associative memory and spiking neural networks, and then describe the architecture and training procedure for the system. The results show that spiking neural networks can be effective for implementing associative memory systems, and have potential applications in a range of computational neuroscience and machine learning problems.

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List of Symbols

Ω Unit of Resistance

ε' Real part of dielectric constant

c Speed of light

λ Wavelength

δ Delta

Chapter 1

Introduction

The ability to store and retrieve associations between different stimuli is a fundamental component of many cognitive processes, including perception, learning, and memory. Associative memory is a type of memory system that allows for the storage and retrieval of relationships between different items in memory. It is a key component of many artificial intelligence and machine learning systems, and has been extensively studied in both neuroscience and computer science.

Spiking neural networks (SNNs) are a type of neural network that can simulate the dynamics of individual neurons and synapses in the brain. They have been shown to be effective for modeling a range of cognitive and sensory processing tasks, and have potential applications in a variety of fields, including computational neuroscience and machine learning.

In this report, we present a study on the construction of an associative memory system using a spiking neural network. We describe the architecture and training procedure for our system, and evaluate its performance on a variety of associative memory tasks. We discuss the implications of our results for the use of SNNs in implementing associative memory systems, and highlight their potential applications in computational neuroscience and machine learning.

Chapter 2

Literature Review

Technical writing is writing or drafting technical communication used in technical and occupational fields [1], such as computer hardware and software [2], engineering, chemistry, aeronautics, robotics, finance [3], medical, consumer electronics, biotechnology, and forestry. Technical writing encompasses the largest sub-field in technical communication. See figure 2.1 that shows the autonomous systems in Internet.

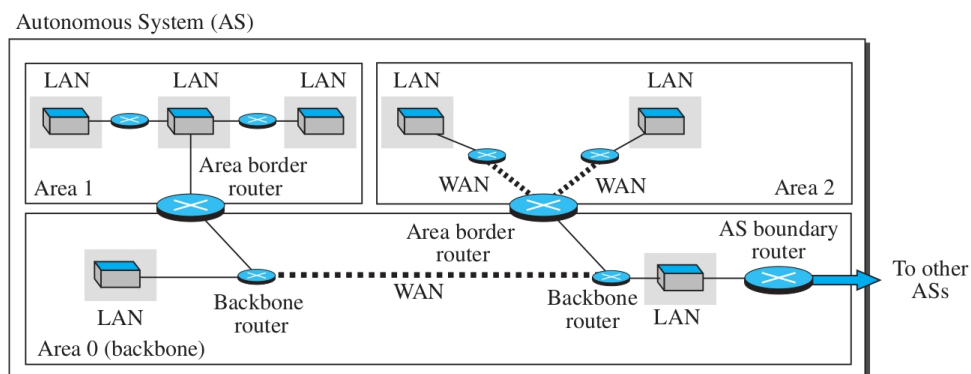


Figure 2.1: Autonomous System Hierarchy

2.1 section1

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2.1.1 title 2

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The system is described by the equation 2.1 below. Here y is the ordinate and x is the abscissa, m is the slope and c a constant.

$$y = mx + c \quad (2.1)$$

Page centered and unnumbered multiple equations. The * symbol suppresses equation numbering.

$$2x - 5y = 8$$

$$3x + 9y = -12$$

Side by side figures can be created using this environment. See fig 2.2 below.

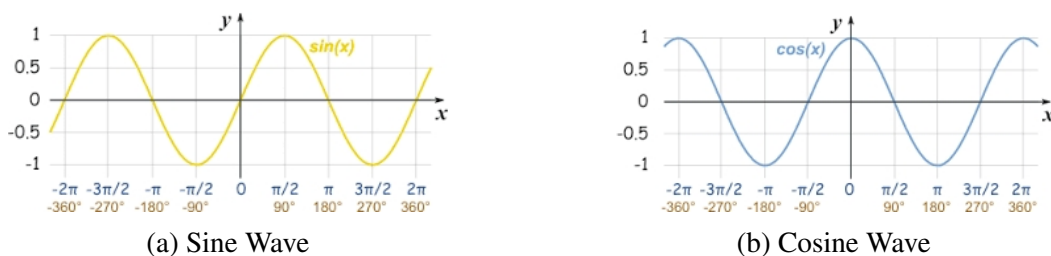


Figure 2.2: The Sine and Cosine waves

Chapter 3

Results

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quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu
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fermentum vel, eleifend faucibus, vehicula eu, lacus.

Table 3.1: test table

Sl. No	Item 1	Itm 2
1	37	45
2	42	23
3	47	1
4	52	-21
5	57	-43
6	62	-65
7	67	-87
8	72	-109
9	77	-131
10	82	-153

Chapter 4

Conclusion

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

References

- [1] HU, Yun Chao, et al., *Mobile edge computing?A key technology towards 5G*, ETSI white paper, 2015, vol. 11, no 11, p. 1-16.
- [2] @online Raspberry pi, <https://www.raspberrypi.org/> Online; accessed 10-June-2019
- [3] HU, Yun Chao, et al., *Mobile edge computing?A key technology towards 5G*, ETSI white paper, 2015, vol. 11, no 11, p. 1-16.