

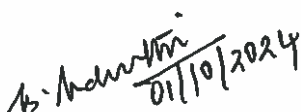
CERTIFICATE

I Certify that the thesis entitled "Modified Extreme Learning Machine Algorithm with Deterministic Weight Modification for Investment Decisions based on Sentiment Analysis" submitted to Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for the award of **Doctor of Philosophy (Ph.D.) in Computer Science** is the record of original research work carried out by **Kalaiselvi K** during the period from **January 2020 to October 2024** of her study in the Department of Computer Science, to Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore under my guidance and supervision, and that this work has not formed the basis for the award of any Degree/ Diploma/Associate ship/Fellowship or other Titles in this Institute or any other University or Institution of Higher Learning.


Signature of the Head of the Department

Department of Computer Science
Avinashilingam Institute for Home Science
and Higher Education for Women
(Deemed to be University under Category 'A' by MHRD, Estd. w/o 3 of DGC Act 1976)
Recognized with 'A+' Grade by NAAC, Recognized by DGC Order Section 123
Coimbatore - 641 043, Tamil Nadu, India


Signature of the Supervisor


Signature of the Dean

Dr. G.PADMAVATHI
M.Sc., M.Phil., Ph.D., MISTE, MCSI.,
Dean, School of Physical Science and
Computational Sciences
Avinashilingam Institute for Home Science
and Higher Education for Women
(Deemed to be University)
Coimbatore - 641 043

DECLARATION

I hereby declare that the matter embodied in the thesis entitled "**Modified Extreme Learning Machine Algorithm with Deterministic Weight Modification for Investment Decisions based on Sentiment Analysis**" submitted by me for the degree of Doctor of Philosophy (Ph.D.) is the record of work carried out by me in the Department of Computer Science, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, during the period from **January 2020 to October 2024** under the guidance of **Dr. Vasantha Kalyani David, Professor, Department of Computer Science, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore** and it has not formed the basis for the award of any Degree/Diploma/Associate ship/ Fellowship or similar title in any other institute or any other University or other similar institution of Higher Learning.

Vasantha Kalyani David
1/10/2024
Signature of the Supervisor

[Handwritten Signature]
Signature of the Research
Scholar

ACKNOWLEDGEMENT

At the outset, I would like to express my sincere gratitude to the God Almighty for his/her constant love, blessing and grace showered on me making my meaningful and worthwhile to the society.

I express my reverential gratitude to **Late Sri. T.S. Avinashilingam Ayya Avl.**, Founder and the First Chancellor, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing this temple of learning for women.

My reverential gratitude to **Late Dr. (Tmt) Rajammal P. Devadas Amma Avl.**, M.A., M.Sc., Ph.D. (OHIO State), Hon. D.Sc., Hon. D.Sc., Former Chancellor, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, *for her heavenly blessings.*

I express my gratitude to the **Late Padma Shri. Dr. P. R. Krishnakumar**, Former Chancellor, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing me with an opportunity, infrastructure and all the amenities to carry out the research.

I express my heartfelt thanks to Former **Chancellor Dr. S. P. Thyagarajan**, D.Sc., M.D., Ph.D., Avinashilingam Institute for Home Science and Higher Education for women, for providing me the moral support for the conduct of research work.

I express heartfelt thanks to **Chancellor Sri. T.S.K. Meenakshisundaram**, M.A., M.Phil., Ph.D., Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing the facilities to conduct the study.

I express my immense gratitude to **Dr. (Mrs.) Premavathy Vijayan**, M.Sc., M.Ed., Dip. Spl. Edn. (U.K.), M.Phil., Ph.D., Former Vice Chancellor, Avinashilingam Institute for home science and Higher Education for women for her constant encouragement throughout the research work.

I express my sincere gratitude to **Dr. (Mrs) V.Bharathi Harishankar** Ph.D., FRSA, Vice Chancellor, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing the necessary platform and support for research work.

My sincere thanks to **Dr. (Mrs) S. Kowsalya**, M.Sc., M.Phil., Ph.D., Former Registrar, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing the opportunity to do this research.

My sincere thanks to **Dr. (Mrs) H. Indu**, M.Sc(Phy)., M.Ed., SLET(Edn)., Dip in Multimedia., M.Phil(Education)., Ph.D(Education)., M.B.A (Education Management), Registrar, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing the opportunity to do this research.

I sincerely thank to **Dr. (Mrs) K. Manimozhi**, M.Sc., B.Ed. M.Phil., Ph.D., Former Controller of Examination, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for giving suggestions and support to me at all times of need.

I owe deep gratitude to **Dr. (Mrs.) K. Sambath Rani M.R.Sc**, M.Phil., M.Ed, (MR+VI), Ph.D., NET, Controller of Examination, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her constant encouragement, support and wishes.

I record my gratefulness to **Dr. (Mrs.) P.Lalitha**, M.Sc., M.Phil., Ph.D., Dean, R&D (i/c), Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for her timely help, support and encouragement in carrying out the research work.

I am also thankful to **Dr. (Mrs). K. Udaya Chandrika**, M.Sc., M.Phil., Ph.D., Former Dean, School of Physical Sciences and Computational Sciences, for granting the facilities required. I am obliged for their extended support throughout my work.

I sincerely thank **Dr. (Mrs) G. Padmavathi**, M.Sc., M.Phil., Ph.D., Dean, School of Physical Sciences and Computational Sciences, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing her constant encouragement, motivation, and suggestions for my research work.

My thanks are also due to **Dr. (Mrs.) S.N. Geethalakshmi**, MCA., M.Phil., Ph.D., Former Professor and Head,, Department of Computer Science, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her blessings, support, timely help, encouragement and cooperation rendered towards the completion of this research.

My thanks are also due to **Dr. (Mrs.) B. Kalpana**, M.Sc., M.Phil , Ph.D., Professor and Head, Department of Computer Science, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her blessings, support, timely help, encouragement and cooperation rendered towards the completion of this research.

My heartfelt and deep sense of gratitude to my beloved supervisor, **Dr. (Mrs.) Vasantha Kalyani David**, M.Sc., M.Phil. (Maths), M.Phil (Comp.Sc.), Ph.D., Former Professor and Head ,Department of Computer Science., who enlivened and gave a golden opportunity to carry out my research on this topic, which helped me a lot to learn many new things. I am very grateful for her continuous guidance with all the useful discussions and brainstorming sessions, especially during the difficult conceptual development stage of my research. She has always been my thriving force and inspiration. Her unwavering enthusiasm for research kept me constantly engaged and fortified my passion for research.

I sincerely thank Doctoral Committee expert **Dr.(Mrs.) B. Rajathilagam, Ph.D., Professor, School of Computing**, Amrita Vishwa Vidyapeetham, Coimbatore, for providing constructive ideas and valuable suggestions during the Doctoral Committee meeting that helped me to enhance the work.

I am so thankful to all research scholars, staff members, Department of Computer Science and members of Computer Center, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for their support, cooperation, suggestions and wishes.

I extend my heartfelt thanks to **my husband, son** and all my family members for their unwavering love, prayers, support, blessings and encouragement throughout this endeavor. I am also grateful to my friends and everyone else who has offered their support and well-wishes along the way. Besides this, I would like to extend my gratitude to one, and all who have knowingly or unknowingly, directly or indirectly help me in the successful completion of this work.

I am also grateful to the Almighty for the blessings throughout the journey which walks me in the correct direction for successful completion of this work.

Kalaiselvi K

LISTS OF TABLES

TABLE NO.	TITLES	PAGE NO.
1	Comparisons Of BSE And NSE	6
2	Phase - I	
	Training Performance Comparisons For MSE	64
3	Testing Performance Comparisons For MSE	64
4	Training Performance Comparisons For RMSE	65
5	Testing Performance Comparisons For RMSE	65
6	Training Performance Comparisons For MAE	66
7	Testing Performance Comparisons For MAE	66
8	Training Performance Comparisons For MAPE	67
9	Testing Performance Comparisons For MAPE	67
10	Training Performance Comparisons For R-Square	68
11	Testing Performance Comparisons For R-Square	68
12	Phase - II	
	Training Performance Comparisons For MSE	80
13	Testing Performance Comparisons For MSE	81
14	Training Performance Comparisons For RMSE	81
15	Testing Performance Comparisons For RMSE	82
16	Training Performance Comparisons For MAE	82
17	Testing Performance Comparisons For MAE	83
18	Training Performance Comparisons For MAPE	83
19	Testing Performance Comparisons For MAPE	84
20	Training Performance Comparisons For R-Square	84
21	Testing Performance Comparisons For R-Square	85
22	Parameters Of CNN	101
23	The Explanation Of Comments	102

TABLE NO.	TITLES	PAGE NO.
24	User Comments	103
25	Phase - III	
	Training Performance Comparisons For MSE	110
26	Testing Performance Comparisons For MSE	111
27	Training Performance Comparisons For RMSE	111
28	Testing Performance Comparisons For RMSE	112
29	Training Performance Comparisons For MAE	112
30	Testing Performance Comparisons For MAE	113
31	Training Performance Comparisons For MAPE	113
32	Testing Performance Comparisons For MAPE	114
33	Training Performance Comparisons For R-Square	114
34	Testing Performance Comparisons For R-Square	115
35	Training Computation Time	121
36	Testing Computation Time	121
37	HDFC Dataset	143
38	ICICI Bank Dataset	146
39	SBIN Dataset	149
40	Nifty 50 Dataset	152
41	S & P BSE Dataset	155

LISTS OF FIGURES

Figure Nos.	TITLE	Page Nos.
1	Types Of Machine Learning Algorithms	11
2	Architecture Of Proposed Method	50
3	Framework Of ELM	55
4	DWM-ELM For Stock Price Prediction	60
5	Phase - I	
	Training Performance Comparisons For MSE	69
6	Testing Performance Comparisons For MSE	69
7	Training Performance Comparisons For RMSE	70
8	Testing Performance Comparisons For RMSE	70
9	Training Performance Comparisons For MAE	71
10	Testing Performance Comparisons For MAE	71
11	Training Performance Comparisons For MAPE	72
12	Testing Performance Comparisons For MAPE	72
13	Training Performance Comparisons For R-Square	73
14	Testing Performance Comparisons For R-Square	73
15	Phase - II	
	Training Performance Comparisons For MSE	85
16	Testing Performance Comparisons For MSE	86
17	Training Performance Comparisons For RMSE	86
18	Testing Performance Comparisons For RMSE	87
19	Training Performance Comparisons For MAE	87
20	Testing Performance Comparisons For MAE	88
21	Training Performance Comparisons For MAPE	88
22	Testing Performance Comparisons For MAPE	89
23	Training Performance Comparisons For R-Square	89
24	Testing Performance Comparisons For R-Square	90

Figure Nos.	TITLE	Page Nos.
25	Architecture Of CNN	95
26	Overview Of The Proposed Framework	99
27	Examples Of Stock Twit's Dataset	100
28	Hidden Neurons Vs MSE	106
29	Phase - III Training Performance Comparisons For MSE	116
30	Testing Performance Comparisons For MSE	116
31	Training Performance Comparisons For RMSE	117
32	Testing Performance Comparisons For RMSE	117
33	Training Performance Comparisons For MAE	118
34	Testing Performance Comparisons For MAE	118
35	Training Performance Comparisons For MAPE	119
36	Testing Performance Comparisons For MAPE	119
37	Training Performance Comparisons For R-Square	120
38	Testing Performance Comparisons For R-Square	120
39	Training Computation Time	122
40	Testing Computation Time	122
41	Training Performance Comparisons For S&P Sensex Dataset	123
42	Testing Performance Comparisons For S&P Sensex Dataset	123
43	Training Performance Comparisons For Nifty 50 Dataset	124
44	Testing Performance Comparisons For Nifty 50 Dataset	124
45	Training Performance Comparisons For The SBIN Dataset	125
46	Training Performance Comparisons For The SBIN Dataset	125
47	Training Performance Comparisons For The ICICI Dataset	126
48	Testing Performance Comparisons For The ICICI Dataset	126
49	Training Performance Comparisons For The HDFC Dataset	127
50	Testing Performance Comparisons For The HDFC Dataset	127
51	Training Performance Comparisons For Microsoft Dataset	128
52	Training Performance Comparisons For Microsoft Dataset	128