THE ROLE OF CONVOLUTIONAL NEURAL NETWORK (CNN) AND RECURRENT NEURAL NETWORK (RNN) ON LEADERSHIP AND WORKFORCE AGILITY IN UMSU POSTGRADUATE PROGRAMS

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Abstract:
Convolutional Neural Network (CNN) is a development of Multilayer Perceptron (MLP) designed to process and classify data. Recurrent Neural Network (RNN) is an artificial neural network architecture known for its good performance as it processes input data sequentially. In a study conducted by Sugiharto et al., the Recurrent Neural Network method was found to have an accuracy rate of 65%, with an average macro precision of 0.59, an average macro recall of 0.62, and an average macro F1-score of 0.60. The weighted average precision was 0.67, the weighted average recall was 0.65, and the weighted average F1-score was 0.65. Both Convolutional Neural Network and Recurrent Neural Network can be used for research in organizational management, especially in the postgraduate program at Universitas Muhammadiyah Sumatera Utara. The development of artificial intelligence-based systems can also assist management in providing better services. This research describes the implementation of Convolutional Neural Network (CNN) with Recurrent Neural Network (RNN) to examine the roles of Leadership and Workforce Agility in organizational agility within the postgraduate program at UMSU. The analysis results draw conclusions regarding the best values for accuracy, precision, recall, and F-measure between the Convolutional Neural Network (CNN) and Recurrent Neural Network algorithms.
Keywords: *Convolutional Neural Network, Workforce Agility.*

INTRODUCTION

Organizational Agility is the ability of an organization to change and make business rules more effective and efficient when facing various types of changes within the company. This capacity makes the organization more responsive, flexible, and innovative (Gultom, 2022). Boosting Organizational Agility can be achieved, in part, through leadership and workforce agility. Agility leadership is a leadership style that is highly needed in the modern era. The leadership system of a leader significantly influences the progress of an institution (Apriani, 2019). Agility leadership has a positive and significant impact on organizational agility.

In a study conducted by Pretorius et al., the presence of Artificial Intelligence technology is a breakthrough in educational technology to facilitate activities in educational institutions. The wise and controlled use of technology can accelerate progress in educational institutions (Pretorius & Kotze, 2021). The emergence of Artificial Intelligence technology can also bring about changes in the evaluation of Organizational Agility. One branch of artificial intelligence is Deep Learning, a method in artificial intelligence (AI) that teaches computers

to process data in a way inspired by the functioning of the human brain. Deep learning models can recognize complex patterns in images, text, sound, and other data to generate accurate insights and predictions.

This study will combine several Neural Network algorithms, namely Recurrent Neural Network (RNN) and Convolutional Neural Network (CNN), where RNN is a deep learning algorithm that can be used to recognize patterns and make predictions on numerical time series data (Caniago et al., n.d.). Subsequently, the RNN algorithm will be combined with the Convolutional Neural Network (CNN) algorithm in the data classification process.

Convolutional Neural Network (CNN) is a development of Multilayer Perceptron (MLP) designed to process and classify data (Paraijun et al., 2022). In data classification, there are two processes: learning and classification (Wang et al., 2023). Recurrent Neural Network (RNN) is an artificial neural network architecture known for its good performance as it processes input data sequentially. In a study conducted by Sugiharto et al., the Recurrent Neural Network method was found to have an accuracy rate of 65%, with an average macro precision of 0.59, an average macro recall of 0.62, and an average macro F1-score of 0.60. The weighted average precision was 0.67, the weighted average recall was 0.65, and the weighted average F1-score was 0.65 (Sugiharto et al., 2022).

LITERATURE REVIEW
Agency Theory
Agency theory is a theory that discusses about the behavior of various parties have an interest, namely between the principal (superior) and agent (subordinate) (Satibi & Atik, 2023). Public sector in Indonesia already unconsciously using agency theory. Relationship theory agencies with this research are available interests between the Langkat Regency Regional Government as agent and society as principal. In this case the Regional Government (agent) acts as a party authority to make decisions, while the community (principal) is the party who reserves the right to evaluate synchronous use applicable regulation (Nasution, 2023).

Budget Slack
According to Selten & Klievink (2024) and Nasution (2020) The budget slack is intentional made by an agent (subordinate) in making budget plans and its practical implementation. This is done to improve the performance of an organization (Mahaarcha & Sirisunhirun, 2023). The bad impact of This budget slack is an imprecision resource allocation and the nature of evaluation budget performance could be biased (Rodrigues & Carvalho, 2023).

Budget Participation
Budget participation is a discussion together between superiors and subordinates where decisions can be made from the results of these discussions impact on the future and able to have an impact on the parties involved in making that decision (Wang et al., 2023). More and more the number of members who participated in the preparation rules then there is a possibility of gaps occurring There are also many rules (Zhang & Mora, 2023). Several previous studies were carried out by Hoai et al. (2022) and Aysan et al. (2023) Research results shows that budget participation has a significant positive influence on budget slack. Based on the description above, then the following hypothesis is proposed:
H1: Budget participation has an effect positive for budget slack.

Organizational Culture
Organizations with a strong culture will strive to implement appropriate budgets with needs without any other purpose (Obicci et al., 2021). Very cultural influence individual behavior in an organization is included in the implementation of the process budgeting. Deep sense of togetherness organization can be a trigger party subordinates and superiors make

improvements participation in the budgeting process so it will increase the risk of occurrence budget slack (Cárcaba et al., 2022). The higher the organizational culture, the higher it will be increasing regulatory gaps. Study previously done by Msongole et al. (2022), and Carnero et al. (2023) shared that organizational culture negative effect on budget slack. based on the description above then the following hypothesis is proposed:

H2: Organizational culture has a positive effect against budget slack.

Organizational Commitment

Organizational commitment is an encouragement from within someone to do something to support success organization in accordance with its objectives and prioritize the interests of the organization. Organizational commitment can have an influence to the budgeting process because it is deep the budgeting process contains commitments subordinates to set and achieve targets predetermined budget. The higher it is organizational commitment will be higher budget slack. This happens because when individuals are loyal to the organization, then the ability to do so can emerge and try to do the best in achieving organizational goals (Tangney et al., 2023). Previous research conducted by Vilarinho et al. (2023) shows that organizational commitment is not very influence the budget gap. Different from research conducted by Mantilla-García et al. (2023) the results of his research show that organizational commitment has an influence positive for budget slack. Based on the description above, it is proposed hypothesis as follows:

H3: Organizational commitment has an influence positive for budget slack.

Environmental Uncertainty

Environmental uncertainty is the perceptions of related organizational members are complicated whether or not the environmental conditions faced by the organization (Tan et al., 2022). Uncertain environmental conditions can occur causing differences in information which can cause budget slack. The higher the uncertainty environment will increase budget slack. Previous research carried out by Giglio et al. (2018) and Helm et al. (2024) research results states that environmental uncertainty has no effect on budget slack. Different from research carried out by Kassa & Ning (2023) research results states that environmental uncertainty influence the budget slack. Based on the description above, it is proposed hypothesis as follows:

H4: Environmental uncertainty positive effect on budget slack.

The conceptual framework in this research can be presented as follows:
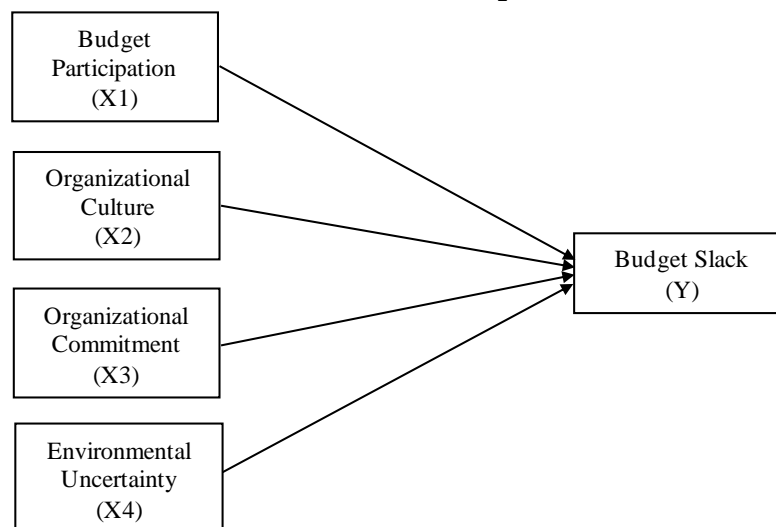

Figure 1. Conceptual Framework

RESEARCH METHODS
A. Convolutional Neural Network

CNN is a variation of Multilayer Perceptron (MLP) designed to process two-dimensional data. Convolutional Neural Network is one of the Deep Learning algorithms that is an extension of Multilayer Perceptron (MLP) designed to process data in two-dimensional form, such as images or sounds (Ilahiyah and Nilogiri 2018).
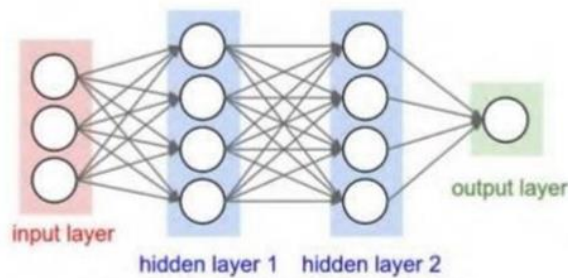
Figure 2. Simple Multilayer Perceptron Architecture

B. Recurrent Neural Network

RNN is one of the deep learning methods and is a form of Artificial Neural Networks (ANN) specifically designed to process continuous/sequential data. RNN is commonly used for tasks related to time series data. Recurrent Neural Network (RNN) is a model of artificial neural network architecture created specifically for processing sequential data.

In the image on the left, there is a circuit diagram where the black box represents the time delay of a time step. The image illustrates an unrolled or unfolded RNN into a full network. Meanwhile, the image on the right shows an RNN that has been unrolled into a full network (Cahyadi, Damayanti, and Aryadani 2020).
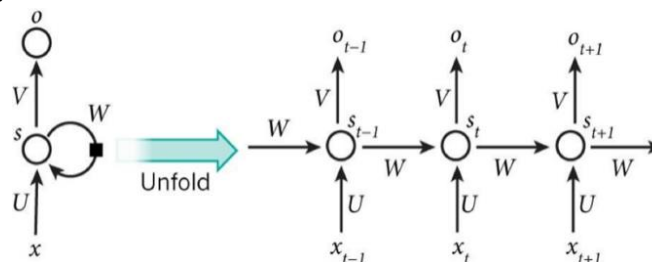
Figure 3. RNN Process during Computation

t = Previous or current time (time step).
t+ = Next time.
xt = Input at time step.
st = Hidden state at each time step.
ot = Output at time step (t).

RNN provides benefits for processing sequential words and long-term memory, resulting in excellent performance and accurate and meaningful responses in open-domain contexts.

RESULTS AND DISCUSSION

In this study, the convolutional neural network (CNN) and recurrent neural network (RNN) algorithms are used to examine the roles of Leadership and Workforce Agility in organizational agility within the UMSU Postgraduate program based on pre-defined categories.
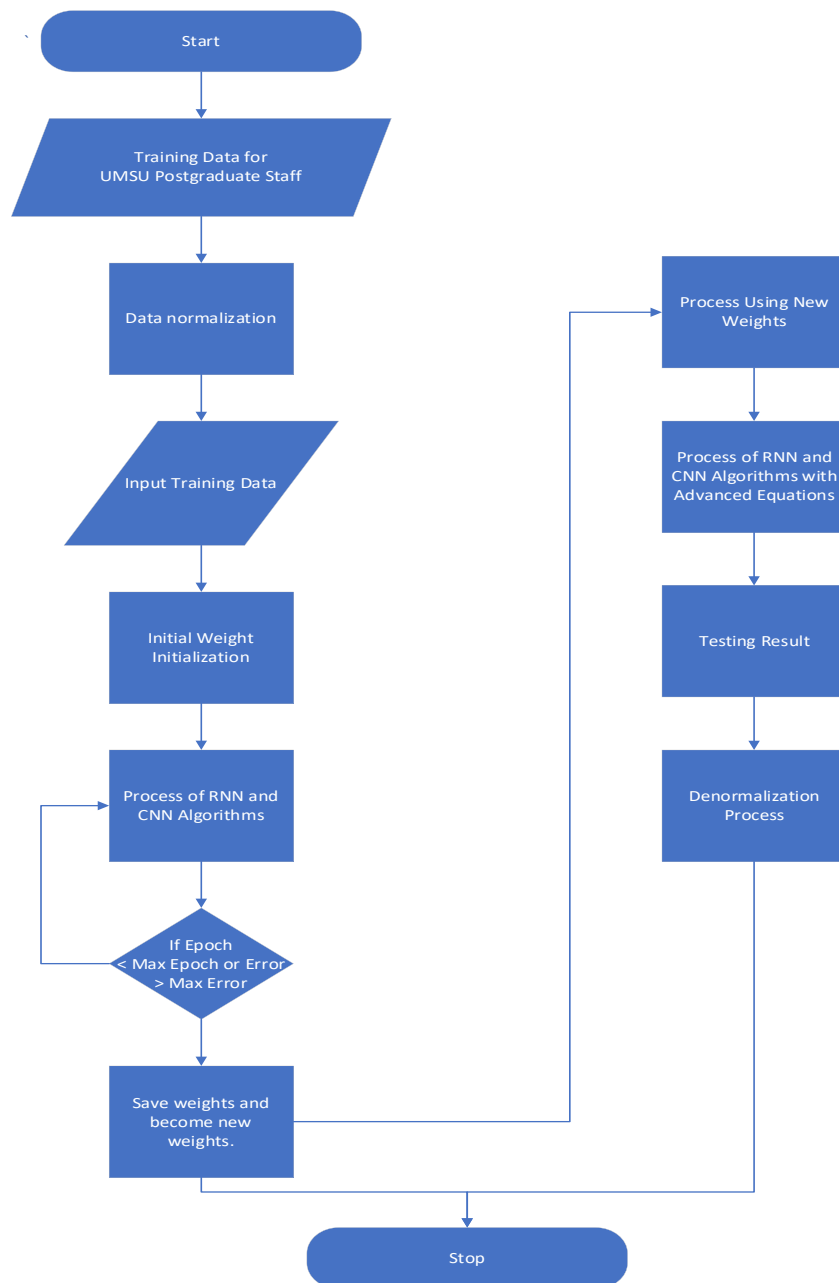
Figure 4. Flow of the process using RNN and CNN Method

Here are the steps of the process flow using RNN and CNN methods as shown in Figure :

1. Training Data for UMSU Postgraduate Staff
   The training data for this research uses UMSU Postgraduate staff data from the year 2023.
2. Data Normalization
   The normalization process aims to group UMSU Postgraduate staff data into tables that show entities and their relationships. It involves transforming numeric column values in the UMSU Postgraduate staff data set to a common scale without distorting differences in value ranges or losing information.
3. Input Training Data
   The data used to train the algorithm consists of 63 records of UMSU Postgraduate staff. Testing data is used to evaluate the results of the training.
4. Initial Weight Initialization

In this process, the weights for each variable are initialized based on predefined values.

5. RNN and CNN Algorithm Process
   Calculation is performed using RNN and CNN algorithms.
6. Save Weights and Become New Weights
   This stage involves updating the weights assigned earlier to form new weight values.
7. Process Using New Weights
   Subsequent calculations are performed using the updated weights.
8. RNN and CNN Algorithm Process
   Calculation is performed again using RNN and CNN algorithms.
9. Testing Results
   Testing is conducted to determine accuracy, precision, recall, and f-measure values.
10. Denormalization Process
    This process aims to reintroduce repetition or duplication of data to execute requests more quickly.

A. Observation

Observation is a data collection technique conducted by directly reviewing the case study location where the research will take place. In this case, the researcher performs observations at UMSU Postgraduate. The data obtained includes information on educators and education personnel, as shown in Table 1 below:

Table 1. Sample Data of UMSU Postgraduate Lecturers 2023

No.	Name	Gender	No.	Name	Gender
1	Prof. Dr. H. Triono Eddy, S.H., M.Hum.	L	102	Dr. Hermawan Syaputra, M.Si.	L
2	Assoc. Prof. Dr. Fitra Jambak, M.Si	L	103	Dr. Zulkifli Amin, M.Si	L
3	Prof. Dr. Ida Hanifa, S.H., M.Hum	P	104	Dr. Muhammad Daut Siagian, M.Pd	L
4	Dr. Alpi Sahari, S.H., M.Hum.	L	105	Dr. Arwin Juli Rakhmad Butar-Butar, M.A	L
5	Assoc Prof. Dr. Adi Mansar, S.H., M.Hum	L	106	Dr. Robie Fanreza M.Pd.I	L
6	Dr. Hazmanan Pasaribu, S.E., M.BA	L	107	Dr. Nurzannah, M.Ag	P
7	Hj. Rahmanita Ginting, M.Sc., Ph.D.	P	108	Assoc. Prof. Dr. Indra Prasetia, S.Pd, M.Si	L
8	Dr. Eka Nurmala Sari, S.E.Ak., M.Si., Ak., CA	P	109	Prof. Emilda Sulasmi, M.Pd	P
9	Dr. Indra Prasetia, S.Pd., M.Si	L	110	Prof. Dr. Elfrianto, M.Pd	L
10	Assoc. Prof. Dr. Ir. Suwarno, M.T	L	111	Dr. Amini, M.Pd	P
11	Dr. Irvan, S.Pd., M.Si	L	112	Dr. Sri Nurabdiah Pratiwi, M.Pd	P
12	Assoc. Prof. Dr. Ida Nadirah, S.H., M.H	P	113	Dr. Salim Aktar, M.Pd	L
13	Dr. Muhammad Syukron Yamin Lubis, S.H., CN., M.Kn	L	114	Dr. Amiruddin, M.Pd	L
14	Dr. Muhammad Thoriq, S.Sos., M.I.Kom	L	115	Assoc. Prof. Dr. Faisal Rahman Dongoran, M.Si	L
15	Assoc. Prof. Dr. Hj. Maya Sari, S.E., Ak., M.Si., CA	P	116	Prof. Dr. Akrim, M.Pd	L
16	Dr. Mhd Isman, M.Hum	L	117	Dr. Astri Novia Siregar, M.Pd	L
17	Rohana, S.T., M.T	L	118	Dr. Istifah Kemal, M.Pd	L
18	Prof. Dr. Mhd. Buchari Sibuea, M.Si	L	119	Dr. Muhammad Isman, M.Hum	L
19	Prof. Dr. H. Elfrianto, M.Pd	L	120	Dr. Irvan, S.Pd, M.Si	L

No	Name	L/P	No	Name	L/P
20	Assoc. Prof. Dr. Bahdin Nur Tanjung, S.E., MM.	L	121	Dr. Zailani, MA	L
21	Assoc. Prof. Ir. Satria Tirtayasa, M.M., Ph.D.	L	122	Dr. Lilik Hidayat Pulungan,M.Pd	L
22	Assoc. Prof. Dr. Ade Gunawan, S.E., M.Si.	L	123	Dr. Zainal Azis	L
23	Assoc. Prof. Dr. Jufrizen, S.E., M.Si.	L	124	Dr.Marah Doly	L
24	Assoc.Prof.Dr.Drs.Sjahril Effendy P.,M.Si,M.A,M.Psi,M.H	L	125	Prof. Dr. Harun Sitompul, M.Pd	L
25	Assoc. Prof. Dr. Januri, S.E., M.M., M.Si.	L	126	Dr. Budi Indra Sadewa, M.Ed	L
26	Assoc. Prof. Fahrizal Zulkarnain, S.T., M.Sc., Ph.D	L	127	Dr. Mahriyuni, M.Hum	P
27	Dr. Hazmanan Khair, S.E., M.B.A.	L	128	Dr. Tutik Sugesti M.Pd	P
28	Prof. Dr. Fajar Pasaribu, S.E., M.Si.	L	129	Prof.Dr.Zainudin	L
29	Dr. Hasrudy Tanjung, S.E., M.Si.	L	130	Dr. Ir. Suwarno, MT	L
30	Dr. Bahril Datuk S. S..E., M.M.,QIA.	L	131	Dr. Josef Hadipramana	L
31	Dr. Syaiful Bahri, M.AP	L	132	Assoc.Prof. Dr. Muhammad Fitra Zambak, M.Sc	L
32	Dr. Widia Astuty, S.E., M.Si., QIA., Ak., CA., CPA.	P	133	Prof.Dr. Ir. Surya Hardi, M.Sc	L
33	Dr. Eka Nurmala Sari, S.E., M.Si., Ak. CA.	P	134	Rohana, ST, MT	P
34	Dr. Irfan, S.E., M.M.	L	135	Dr. Ali Imran M.A	L
35	Dr. Irvan, S.Pd., M.Si.	L	136	Dr. Robie Fanreza, M.Pdi	L
36	Dr. Ir. Hj. Sabrina, M.Si.	P	137	Prof. Dr. Khairil Ansari, M.Pd	L
37	Dr. Hefriansyah, S.E., M.M.	L	138	Dr. Ellisa Fitri Tanjung, S.Pd.I., M.A	P
38	Assoc. Prof. H. Muis Fauzi Rambe, S.E., M.M.	L	139	Dr. Ir. Syafruddin Hasan, M.Sc	L
39	Prof. Dr. H. Hasyimsyah, M.A.	L	140	Ir. Eddy Warman, MT	L
40	Prof. Dr. Ibrahim Gultom, M.Pd.	L	141	Arnawan Hasibuan, ST, MT	L
41	Prof. Dr. Ir. H. Suhendra Sulaiman, MS.	L	142	Prof. Ir. Ts Dr. Muzamir bin Isa	L
42	Dr. Zulkifli Musannip Efendi Siregar, S.Kom., M.M.	L	143	Prof. Dr. H. Nawir Yuslem, M.A.	L
43	Dr. Bahrul Khair Amal, S.E., M.Si.	L	144	Dr.Sulidar, MA.	L
44	Dr. Junaidi, M.Si.	L	145	Prof. Dr. H. Muhammad Arifin, S.H., M.Hum.	L
45	Dr. Ir. Suwito, M.M.	L	146	Dr. T. Erwinsyahbana, S.H., M.Hum.	L
46	Dr. Hastuti Olivia, S.E., M.Ak.	P	147	Assoc. Prof. Dr. Ida Nadirah, S.H., M.H	P
47	Dr. Sri Rahayu, S.E., M.Si.	P	148	Assoc.Prof. Masitah Pohan, S.H., M.Hum	L
48	Dr. Arfan Ikhsan, S.E., M.Si.	L	149	Dr. Luthfan Darus, S.H., M.Kn.,M.H.	L
49	Dr. Suginem, S.E., M.Ak.	P	150	Dr.Dody Syafnul,S.H.,M.Kn	L
50	Dr. Eka Nurmala Sari, S.E., M.Si., Ak., CA	P	151	Dr. Ruslan., SH., MH	L
51	Assoc. Prof. Dr. Hj. Maya Sari, S.E.,Ak., M.Si., CA	P	152	(Cand) Dr.Abd.Rahim Lubis,SH.,M.Kn	L
52	Assoc. Prof. Dr. Zulia Hanum, S.E., M.Si	P	153	Assoc. Prof. Dr. Farid Wajdi, S.H., M.Hum.	L
53	Assoc. Prof. Dr. Syafrida Hani, S.E., M.Si.	P	154	Dr.M.Syukran Yamin Lubis, S.H.,M.Kn	L
54	Assoc. Prof. Dr. Januri, S.E., M.M., M.Si.	L	155	Dr. Alpi Sahari,SH.,M.Hum	L
55	Prof. Dr. Widia Astuty, S.E., M.Si., QIA., Ak., CA., CPA.	P	156	Dr. Eka N.A.M. Sihombing S.H.,M.Hum	L

No.	Name	L/P	No.	Name	L/P
56	Dr. Irfan, S.E., M.M.	L	157	Dr.Drs.Muslim,S.H.,M.A.	L
57	Dr. Hj. Dahrani, S.E., M.Si.	P	158	Prof. Dr. H. Asmuni, M.A.	L
58	Dr. Hazmanan Khair, S.E., M.B.A.	L	159	Assoc. Prof. Dr.H. Surya Perdana,S.H.,M.Hum.	L
59	Prof. Dr. Fajar Pasaribu, S.E., M.Si.	L	160	Assoc. Prof. Dr. Ramlan, S.H.,M.Hum.	L
60	Dr. Hasrudy Tanjung, S.E., M.Si.	L	161	Dr.Faisal, S.H., M.Hum.	L
61	Prof. Dr. Ir. H. Suhendar Sulaiman, MS.	L	162	Prof.Dr. Sutiarnoto, S.H., M.Hum	L
62	Prof. Dr. Sumarno, M.Pd.	L	163	Assoc. Prof. Dr. Ida Hanifah, S.H., M.H.	L
63	Prof. Dr. H. Nawir Yuslem, M.A.	L	164	Dr. Onny Medaline, S.H., M.Kn	L
64	Dr. Sri Rahayu, S.E., M.Si.	P	165	Assoc.Prof. Dr. Adi Mansar, S.H., M.Hum	L
65	Dr. Bastari M., S.E., M.M., BKP.	L	166	Dr.Isnina, S.H. M.H.	L
66	Dr. Ilham Hidayah Napitupulu, S.E., M.Si., Ak., CA.	L	167	Dr. Dadang Suhendi, S.H., M.H	L
67	Dr. Jufri Dharma, S.E., M.Si.	L	168	Dr. Lilawati Ginting, S.H., M.Kn	P
68	Dr. Rahmayanti, S.E.I., M.E.I	P	169	(Cand) Dr.Muhammad Yusrizal, S.H., M.Kn	L
69	Dr. Munawir Pasaribu, M.A	L	170	Dr. Elawijaya., S.H., M.Kn	L
70	Dr. Hastuti Olivia, S.E., M.Ak.	P	171	Dr. Imelda Mardayanti, S.H., M.Kn	P
71	Dr. Herman P., S.E., M.M.	L	172	H.Ikhsan Lubis, S.H.,SpN.MkN	L
72	Dr. H. Ihsan Rambe, S.E., M.Si.	L	173	Dr. Irwansyah, SHI., M.Ag	L
73	Dr. Al Khowarizmi, S.Kom., M.Kom	L	174	Dr. Sudirman Suparmin, M.A	L
74	Assoc. Prof. Dr. RUDIANTO, M.Si.	L	175	Dr. Suprayitno, S.H., M.Kn	L
75	Assoc. Prof. Dr. YAN HENDRA, M.Si.	L	176	Dr. Bahmid, S.H., M.Kn	L
76	Dr. MUHAMMAD THARIQ, S.Sos., M.I.Kom	L	177	Edi Natasari,SH.,M.Kn	L
77	Dr. MAHYUZAR, M.Si.	L	178	Dr. Juli Moertiono, S.H., M.Kn.M.H	L
78	Dr. RIBUT PRIADI, S.Sos., M.I.Kom	L	179	Dr. Bachtiar Simatupang, S.H., MH	L
79	Dr. DADANG HARTANTO, SH, SIK, M.Si.	L	180	Dr. Bastari M, SE., MM., BKP	L
80	Dr. ARIFIN SALEH, MSP.	L	181	Prof. Dr. Tarmizi, SH.,M.Hum	L
81	Dr. LEYLIA KHAIRANI, M.Si	P	182	Dr. Dayat Limbong,SH.,M.Hum	L
82	Dr. MOHD. YUSRI, M.Si.	L	183	Dr. Faisal,SH.,M.Hum	L
83	Dr. FAUSTYNA S.Sos., M.M., M.I.Kom	P	184	Dr. Alpi Sahari,SH.,M.Hum	L
84	Dr. ZAINAL AZIS, MM, M.Si.	L	185	Prof. Dr. H. Tan Kamelo., S.H., M. S.	L
85	Dr. IRVAN, S.Pd, M.Si.	L	186	Prof. Dr. Ibrahim Gultom,M.Pd	L
86	Dr. MUNAWIR, MA	L	187	Dr. Dedi Harianto, S.H., M.Hum	L
87	Prof. Lusiana Andriani Lubis, M.A., Ph. D	P	188	Dr. Dadang Suhendi, S.H., M.H	L
88	Prof. Syukur Kholil Dalimunthe, M.A., Ph. D	L	189	Prof. Dr. H. Triono Eddy, SH.,M.Hum	L
89	Prof. Dr. Hasyimsyah, M.A	L	190	Prof. Dr. H. Ediwarman, SH.,M.Hum	L
90	Dr. Drs. lskandar Zulkamain, M.Si	L	191	Assoc. Prof. Dr. Adi Mansar ,S.H., M.Hum.	L
91	Dr. Sakhyan Asmara, M.SP	L	192	Dr. Didik Miroharjo, S.H., M.Hum.	L

92	Dr. Anang Anas Azhar, S.Ag, M.A	L	193	Dr. Mirza Nasution,SH.,M.Hum	L
93	Syafruddin Pohan, M.Si., Ph. D	L	194	Dr. Cakra Arbas, SH.I, M.H.	L
94	Dr. Sri Nurabdiah Pratiwi, M.Pd.	P	195	Dr. Rizkan Zulyadi, S.H., M.Hum	L
95	Dr. Ellis Mardiana Panggabean, M.Pd.	P	196	Dr. Sutiarnoto, S.H., M.Hum	L
96	Dr. Zainal Azis, M.M., M.Si.	L	197	Dr.Jaholden, S.H., M.Hum	L
97	Dr. Tua Halomoan Harahap, S.Pd., M.Si.	L	198	Dr Mahmud Mulyadi, SH M.Hum	L
98	Dr. Marah Doly Nasution, S.Pd., M.Si.	L	199	Dr. Juli Moertiono, S.H., M.Kn	L
99	Dr. Irvan , M.Si	L	200	Dr. Ida Nadira, S.H., M.Hum	P
100	Dra. Ida Karnasih ,M.Ed., Ph.D.	L	201	Dr. Agusta Ridha Minin,S,H, M.H	L
101	Prof. Dr. Edi Saputra, M.Pd.	L	202	Dr. Azwir Agus, SH., Mhum	L

B. Interview

The interview technique is employed to gather information regarding the roles of Leadership and Workforce Agility in organizational agility within the UMSU Postgraduate program. Based on the interview results with the Director of UMSU Postgraduate, Prof. Dr. H. Triono Eddy, SH., M.Hum, the process involved providing initial data as a benchmark for analyzing organizational agility, enabling the modeling of the system.

C. Literature Review

Literature review is a crucial aspect of research because it serves as a reference on how the issue at hand has been addressed by others. In this research, the literature review is derived from various books, journals that support or explain the discussed problem, and references on the methods used. The literature used during the research includes international and national journals, as well as books.

D. System Design

The system is designed to analyze the influence of variables related to workforce agility and leadership agility on organizational agility. The variables for workforce agility are as follows:
a. Dealing
b. Creative problem-solving
c. Professional flexibility
d. Learning work tasks and procedures
e. Interpersonal adaptability
f. Coping with work stress

The variables for leadership agility are as follows:
a. High energy
b. Self-confidence
c. Stability integrity
d. Flexibility
e. Sensitivity to others

Diagram of Research Stages
In this research, several stages will be conducted as follows:
1. Initial Research

In this stage, research materials are collected from various literature sources such as books, international and national journals, proceedings, magazines, articles, and other relevant sources. Consultation with the thesis advisor is also carried out during the preparation and writing of the thesis.

2. Input Training Data

Data is gathered from readings covering theories that support the research, including references on Deep learning, Machine learning, Convolutional neural network (CNN), recurrent neural network architectures, and Deep learning applications.

3. Initialization

Implementation of the Convolutional neural network (CNN), recurrent neural network algorithms in the context of analyzing the roles of Leadership and Workforce Agility in organizational agility within the UMSU Postgraduate program.

The collected data is processed to design a model system for the roles of Leadership and Workforce Agility in organizational agility within the UMSU Postgraduate program. In this research, the data processing will split the original training data into 80% training data and 20% test data. The data is then transformed into the expected network format and scaled, so that all values are within the interval [0,1]. For example, if the training data is stored in the form of an array (60000, 28, 28) with uint8 data type and values in the interval [0, 255], it is transformed into a float32 array (60000, 28*28) with values between 0 and 1.

4. Analysis

The results of predicting the roles of Leadership and Workforce Agility in organizational agility within the UMSU Postgraduate program using each Convolutional neural network (CNN) and recurrent neural network algorithm are then analyzed using cross-validation to obtain accuracy, precision, recall, and f-measure values for each.

In this stage, data of UMSU lecturers are required to be processed using CNN and RNN methods, which involve several attributes to generate leadership values.
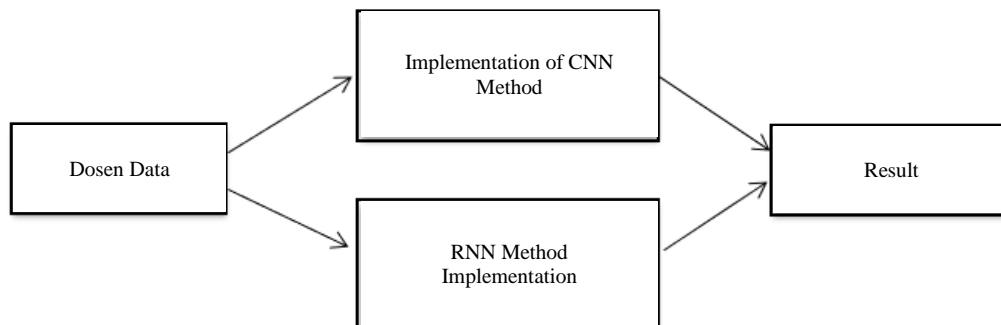

Figure 5. Data Analysis Stage

Application Implementation

In this chapter, the implementation of determining buyer interest in a product using RapidMiner Studio 9.6 is carried out. RapidMiner Studio 9.6 is one of the data mining applications that utilizes the C5.5 Algorithm. This application can solve data mining problems, including generating Decision Trees and Rules, by inputting predefined transformation data.

Figure 6. RapidMiner Studio 9.6

a. Hardware

The hardware used for employee performance classification using RapidMiner Studio 9.6 is a laptop or computer with the following specifications:

1. Minimum Intel Pentium 4 processor or equivalent.
2. Minimum 256 MB Random Access Memory (RAM).
3. Minimum 160 GB hard disk.

b. Testing Stage

After testing the CNN with RNN algorithm, the conclusions are as follows:

1. Theoretical Calculations

Theoretical calculation results with CNN and RNN are presented in the table.

Table 2. of Confusion Matrix and Theoretical Performance

Confusion Matrix					
Prediction CNN			Prediction RNN		
Actual	Good	Not Good	Actual	Good	Not Good
Good	85	Good	Good	194	8
Not Good	109	Tidak Baik	Tidak Baik	0	0

Performance Vektor					
Prediction CNN			Prediction RNN		
Variable	Formula	Result	Variable	Formula	Result
Actual	TP+TN/Jlh	0,46	Actual	TP+TN/Jlh	0,99
Precision	TP/(TP+FP)	1	Precision	TP/(TP+FP)	1
Recall	TP/(TP+FN)	0.5	Recall	TP/(TP+FN)	0.5

Table 3. of Confusion Matrix and RapidMiner Performance

Confusion Matrix					
Prediction CNN			Prediction RNN		
Actual	Good	Not Good	Actual	Good	Not Good

Good	85	Good	Good	194	8
Not Good	109	Not Good	Not Good	0	0
Performance Vektor					
Prediction CNN			Prediction RNN		
Variable	Formula	Result	Variable	Formula	Result
Actual	TP+TN/Jlh	0,46	Actual	TP+TN/Jlh	0,99
Precision	TP/(TP+FP)	1	Precision	TP/(TP+FP)	1
Recall	TP/(TP+FN)	0.5	Recall	TP/(TP+FN)	0.5

From the obtained results, the conclusions for both methods are as follows:

1. The accuracy of the CNN method is 46%, while the accuracy of the RNN method is 99%.
2. The prediction results of the CNN method are rated as "Good" in 85 instances, while the RNN method yields 1008 instances rated as "Good."
3. It can be concluded that the RNN method significantly influences Leadership and Workforce Agility with a percentage of 99%.

CONCLUSION

Based on the discussions from the previous chapters, the following conclusions can be drawn:

1. Based on the results of the RapidMiner test on UMSU lecturer data, it is concluded that the CNN method has a 46% influence on Leadership and Workforce Agility.
2. Based on the RapidMiner test results on UMSU lecturer data, it is concluded that the RNN method has a 99% influence on Leadership and Workforce Agility.
3. By using the attributes of UMSU lecturer discipline, the implementation of Convolutional Neural Network (CNN) with Recurrent Neural Network (RNN) on Leadership and Workforce Agility in RapidMiner can be realized.
4. The accuracy of the CNN method is 46%, and the accuracy of the RNN method is 99%. The prediction results of the CNN method are rated as "Good" in 85 instances, while the RNN method yields 1008 instances rated as "Good."

Recommendations for the Role of Convolutional Neural Network (CNN) with Recurrent Neural Network (RNN) on Leadership and Workforce Agility in the UMSU Postgraduate Program are as follows:

1. It is advisable to compare similar algorithms to obtain clear comparison results.
2. It is recommended to use only one algorithm to get results consistent with the applied algorithm.
3. It is suggested to use better attributes.

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