

TABLE XII
CONFUSION MATRIX TESTING

Network Model	Match	Not Match
Test Result nn10lr001	72%	28%
Test Result nn10lr01	72%	28%
Test Result nn10lr03	72%	28%
Test Result nn50lr001	77%	23%
Test Result nn50lr01	74%	26%
Test Result nn50lr03	77%	23%
Test Result nn100lr001	74%	26%
Test Result nn100lr01	77%	23%
Test Result nn100lr03	72%	28%

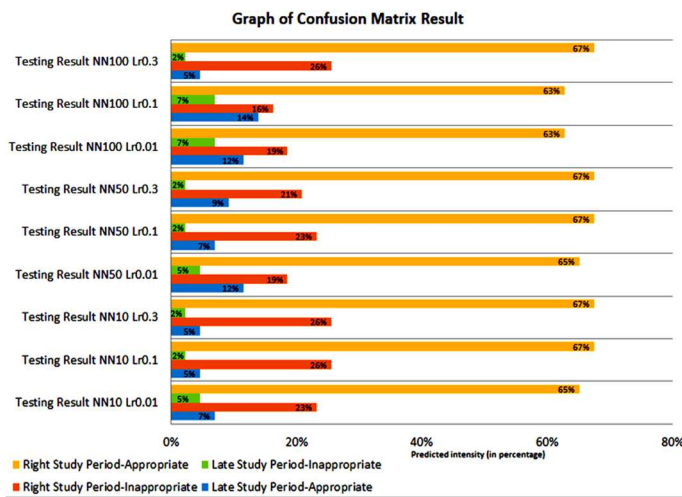


Fig. 11 Confusion matrix test result

IV. CONCLUSION

Based on the results, this study can be formulated as follows. MSE value represented the difference of the study period data between the real and the prediction. The value is both for training dan testing with the best result on the pattern of neuron network 50 with 0,01 as a learning rate. Based on the detail of MSE value, the training is 0,017516, and the testing is 0,047721. Then, the network pattern with 50 neurons with the training process using 0,01 as a learning rate produces a percentage of 77% compatibility. Generally, the study period's prediction results using neural networks have a good result with an average percentage of suitability above 70%.

Future research is still focused on the pattern of GPA in semester 1 to semester 4. Furthermore, it can be developed

with different input values. Therefore, it is recommended to combine several algorithms for processing input data at the preprocessing stage, such as natural selection, genetic algorithm, or other algorithms that support neural networks to increase accuracy.

REFERENCES

- [1] S. Haryati, A. Sudarsono, and E. (2015) Suryana, "Implementasi Data Mining untuk Memprediksi Masa Studi Mahasiswa Menggunakan Algoritma C4.5," *J. Media Infotama*, vol. 11, no. 2, pp. 130–138, 2015.
- [2] V. Riyanto, A. Hamid and Ridwansyah, "Prediction of Student Graduation Time Using The Best Algorithm" *IJAIDM Indonesian Journal of Artificial Intelligence and Data Mining.*, vol. 2, no. 1, pp. 1–9, 2019.
- [3] A. Nurhuda and D. Rosita, "Prediction Student Graduation on Time Using Artificial Neural Network on Data Mining Students STMIK Widya Cipta Dharma Samarinda," pp. 86–89, 2017.
- [4] A. S. Kurniawansyah, "Implementasi Metode Artificial Hasil Ujian Kompetensi Kebidanan," *J. Pseudocode*, vol. V, no. 1, 2018.
- [5] S. Asthana, D. Goyal, and A. Pandit, "Analysis on Multiple Hidden Layer Complexity of BPNN," *Int. J. Appl. Eng. Res.*, vol. 12, no. 14, pp. 4723–4728, 2017.
- [6] C. Ahmad, "Implementasi Neural Network Untuk Memprediksi Jumlah Penderita Tuberculosis," *Emit. J. Tek. Elektro*, vol. 16, no. 01, pp. 43–50, 2015.
- [7] E. Priyanti, "Implementasi Neural Network Pada Prediksi Pendapatan Rumah Tangga," *Swabumi*, vol. 6, no. 1, pp. 18–26, 2018.
- [8] Efreem Yohannes Obsie and S. A. Adem, "Prediction of Student Academic Performance using Neural Network, Linear Regression and Support Vector Regression: A Case Study," *Int. J. Comput. Appl.*, vol. 180, no. 40, pp. 39–47, 2018.
- [9] MA. Umar, "Student Academic Performance Prediction using Artificial Neural Networks: A Case Study," *International Journal of Computer Applications.*, vol. 178, no. 48, pp. 24–29, 2019.
- [10] Y. T. Samuel, J. J. Hutapea, and B. Jonathan, "Predicting the timeliness of student graduation using decision tree c4.5 algorithm in universitas advent Indonesia," *Proc. 2019 Int. Conf. Inf. Commun. Technol. Syst. ICTS 2019*, pp. 276–280, 2019.
- [11] S. Wibowo, R. Andreswari, and M. A. Hasibuan, "Analysis and design of decision support system dashboard for predicting student graduation time," *Int. Conf. Electr. Eng. Comput. Sci. Informatics*, vol. 2018-10, pp. 684–689, 2018.
- [12] S. Agatonovic-Kustrin and R. Beresford, "Basic concepts of artificial neural network (ANN) modeling and its application in pharmaceutical research," *J. Pharm. Biomed. Anal.*, vol. 22, no. 5, pp. 717–727, 2000.
- [13] G. Florin, *Data Mining: Concepts, Models and Techniques*. Romania: Springer, 2011.
- [14] D. Puspitaningrum, *Pengantar Jaringan Syaraf Tiruan*. Yogyakarta: Andi, 2006.
- [15] A. Hasim, "Prakiraan Beban Listrik Kota Pontianak Dengan Jaringan Syaraf Tiruan (Artificial Neural Network)," *Cent. Libr. Bogor Agric. Univ.*, p. 1, 2008.
- [16] M. T. Hagan, *Neural Network Design*. USA: PWS Publishing Co, 1996.
- [17] F. L., *Fundamentals of Neural Networks Architectures, Algorithms and Applications*. London: Prentice-Hall, Inc, 1994.
- [18] W. J. Stevenson and S. Chee Chuong, *Manajemen Operasi Perspektif Asia*. Jakarta: Salemba Empat, 2014.
- [19] S. B., *Data Mining: Teknik Pemanfaatan Data untuk Keperluan Bisnis*. Yogyakarta: Graha Ilmu, 2007.
- [20] J. Han, J. Kamber, M, & Pei, *Data Mining: Concept and Techniques, Second Edition*. Waltham: Morgan Kaufmann Publishers, 2006.