

error, it provides users with better security than the general method.

4. Conclusions

Recently, crimes committed using fraudulent calls have been increasing. The majority of blacklist applications on the market uses a database to filter calls and cannot determine anything about the unknown calls. In this study, we use a two-stage filter. In the first stage, it uses phone books and databases in the system to make a judgment. If it is an unknown call, the filter will enter the second stage. In the second stage, the filter uses ANFIS to access the Internet in search of expert experience using region numbers as conditions and determine the risk factor. When attacked by fraudulent calls in training 4 conditions, there is a very high accuracy rate (90%). The database of this system can be even more enhanced because of the users' shared knowledge and increased amounts of information in the future.

Table 1: The error rate using the blacklist and proposed method

Test data	Training training training training				
	1	2	3	4	
Blacklist events	20%	40%	60%	80%	
Proposed method	Training error	7.03%	17.01%	1.19%	18.56%
	Test error	1.50%	3.25%	5.50%	9.25%
Database-based filter	Test error	20%	40%	60%	80%

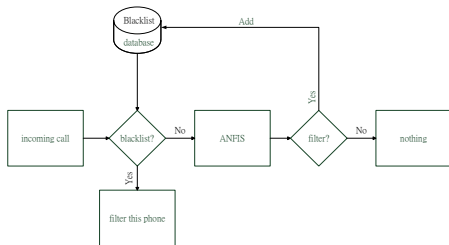


Fig. 1: Smart blacklist system program flowchart

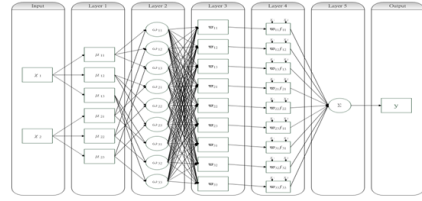


Fig. 2: ANFIS structure diagram



Fig.3: The home screen of the smart blacklist filter



Fig. 4: The view of an unknown caller

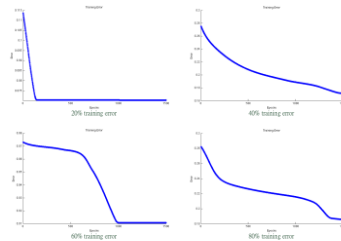


Fig. 5: The training error of the proposed system

5. References

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