

TABLE V
ANALYSIS OF SETIU RESULT

Association Rules	Support	Confidence	Lift	River	Station	Water Level
CHALOK KEDAI = Y ==> KG. LANGKAP = Y	0.3	1	2.89	Sg. Setiu	Jambatan Permaisuri	9.84 (Danger)
CHALOK KEDAI = Y ==> KG. BESUT = Y KG. LANGKAP = Y	0.3	1	2.89	Sg. Setiu	Jambatan Permaisuri	9.16 (Danger)
MERBAU MENYUSUP = Y ==> PENGKALAN MERBAU = Y	0.25	1	4.33	Sg. Setiu	Jambatan Permaisuri	8.48 (Warning)
MERBAU MENYUSUP = Y 6 ==> KG. BESUT = Y PENGKALAN MERBAU = Y 6	0.25	1	4.33	Sg. Setiu	Jambatan Permaisuri	8.29 (Warning)
MERBAU MENYUSUP = Y 6 ==> CHALOK KEDAI = Y PENGKALAN MERBAU = Y 6	0.25	1	4.33	Sg. Setiu	Jambatan Permaisuri	7.86 (Alert)

TABLE VI
ANALYSIS OF KUALA TERENGGANU RESULT

Association Rules	Support	Confidence	Lift	River	Station	Water Level
KG. TANJUNG DAMAI = Y ==> TAMAN PUSU TIGA = Y	0.3	1	2.23	Sg. Nerus	Kg. Bukit	12.841 (Danger)
KG. BANGGOL PERADONG = Y ==> KG. BARU TETAMBAH = Y	0.3	1	4.14	Sg. Nerus	Kg. Bukit	12.762 (Danger)
TAMAN PUSU TIGA = Y KG. JERAM = Y ==> KG. BANGGOL PERADONG = Y	0.3	1	4.14	Sg. Nerus	Kg. Bukit	14.299 (Danger)
TAMAN PUSU TIGA = Y KG. JERAM = Y ==> KG. BARU TETAMBAH = Y 7	0.3	1	4.14	Sg. Nerus	Kg. Bukit	13.174 (Danger)
KG. BANGGOL PERADONG = Y ==> TAMAN PUSU TIGA = Y KG. BARU TETAMBAH = Y	0.3	1	4.14	Sg. Nerus	Kg. Bukit	12.928 (Danger)
KG. BARU TETAMBAH = Y ==> TAMAN PUSU TIGA = Y KG. BANGGOL PERADONG = Y	0.3	1	4.14	Sg. Nerus	Kg. Bukit	12.735 (Danger)

TABLE VII
ANALYSIS OF HULU TERENGGANU RESULT

Association Rules	Support	Confidence	Lift	River	Station	Water Level
KG. KEPAH=Y ==> KG. MATANG=Y KG. MENERONG=Y	0.3	1	3.45	Sg. Terengganu	Kg. Tanggol	6.83 (Normal)
KG. KEPAH=Y KG. PENGKALANG AJAL=Y ==> KG. MATANG=Y KG. MENERONG=Y	0.3	1	3.45	Sg. Berang	Kg. Menerong	25.894 (Danger)
KG. PAYA BESAR=Y KG. MENERONG=Y ==> KG. MENJING=Y KG. BATU 23=Y	0.3	1	3.17	Sg. Berang	Kg. Menerong	25.309 (Danger)
KG. MENJING=Y KG. BATU 23=Y ==> KG. PAYA BESAR=Y KG. MENERONG=Y	0.3	1	3.17	Sg. Berang	Kg. Menerong	23.079 (Warning)
KG. PAYA BESAR=Y ==> KG. BATU 23=Y	0.4	0.84	1.88	Sg. Terengganu	Kg. Tanggol	7.44 (Normal)
KG. CHETING=Y ==> KG. MENERONG=Y	0.4	0.79	1.58	Sg. Berang	Kg. Menerong	25.498 (Danger)
KG. CHETING=Y ==> KG. PENGKALANG AJAL=Y	0.4	0.79	1.36	Sg. Berang	Kg. Menerong	25.547 (Danger)
KG. PENGKALANG AJAL=Y ==> KG. MENERONG=Y	0.4	0.82	1.64	Sg. Berang	Kg. Menerong	24.055 (Warning)

TABLE VIII
ANALYSIS OF DUNGUN RESULT

Association Rules	Support	Confidence	Lift	River	Station	Water Level
KUALA JENGAJ = Y ==> JERANGAU = Y 5	0.45	1	1.5	Sg. Dungun	Jambatan Jerangau	11.92 (Warning)
KUALA JENGAJ = Y ==> PASIR RAJA = Y JERANGAU=Y	0.45	1	1.5	Sg. Dungun	Jambatan Jerangau	13.37 (Danger)
JERANGAU = Y 8 ==> PASIR RAJA = Y 8	0.45	1	1.5	Sg. Dungun	Jambatan Jerangau	13.85 (Danger)
KUALA JENGAJ = Y 5 ==> PASIR RAJA = Y 5	0.45	1	1.33	Sg. Dungun	Jambatan Jerangau	13.11 (Danger)

Table 3 specifies that when the water level at alert and warning, the village at flood risk area should be ready. The association of the village shows the prediction of the risky area if a village tends to flood. The water level in alert state at Sg. Besut makes this village “KG. TENANG = Y KG. PADANG BUAL = Y ==> KG. BUKIT MALI = Y KG. PASIR AKAR = Y” were having a flood with 100% confidence, 17% support, and 2.35 lift value. Table 4 illustrates the result of Kemaman District. The association rules of Kemaman have high dependency among rules which is 4.25. Therefore, the rules are strong and if a village has flooded, the probability of the associated village tend to flood is high. The confidence values mostly are 100%.

Setiu district’s result as in Table 5, If Jambatan Permaisuri in Danger level, the village nearby such as Kg. Chalok Kedai, Kg. Besut will easily have flooded. Moreover, at the alert level, this village “MERBAU MENYUSUP = Y 6 ==> CHALOK KEDAI = Y PENGKALAN MERBAU = Y 6” is already having flood due to the rise of river water and affected their area. As in Table 6, Kuala Terengganu will be having a flood when the water level is in danger level. Most of the rules have 30% support values and 100% confident, while lift value is 4.14. The main river is Sg. Nerus and the danger level will make the area has flooded.

Table 7 shows the result of Hulu Terengganu district. There are two stations in the experiment because the villages were situated near them tend to flood. The station has a different range of water level. Therefore, we cannot simply associate the rules with water level easily without considering the topographic factors. Table 8 shows the analysis [23] of Dungun district. Sungai Dungun is the main river which at danger level, it causes a flood to a nearby village. Moreover, best rules have 45% support, 100% confident and 1.5 lift value.

IV. CONCLUSION

The Apriori algorithm normally applies in business transactions, therefore, this research experiment the algorithm using hydrological data sets. The results by implementing the Apriori algorithm produced best rules and created the association of flood area. On the other hand, we can use the rules and create a model to help in flood management. Optimistically, this research can extend to a bigger case study and help in flood management which it is one of biggest catastrophe in Malaysia. Hopefully, the resulting model can help in flood management, especially by giving early warning to residents in flood potential areas in addition to saving lives and property.

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