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Predicting long term regional drought pattern in Northeast India using advanced statistical technique and wavelet-machine learning approach

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Table 1 Drought Classification Based on SPI (Hayes et al. 1999, with Permission)

SPI values	Class
>2.00	Extremely wet
1.50 to 1.99	Very wet
1.00 to 1.49	Moderately wet
-0.99 to 0.99	Near normal
-1.00 to -1.49	Moderately dry
-1.50 to -1.99	Severely dry
<-2.00	Extremely dry

Table 2 Statistical results of PSO-REPTree for predicting multiple decomposed parameters of SPI-6 in training phase

Sets	R	RMSE	MAE	MAPE	Kendall tau	Spearman's rho	RMSPE
a1	0.631	0.701	0.522	1.576	0.381	0.481	4.286
a1+a2	0.758	0.589	0.416	1.037	0.503	0.624	3.362
a1+a2+a3	0.760	0.587	0.442	1.283	0.476	0.599	3.163
a1+a2+a3+a4	0.809	0.535	0.388	1.737	0.654	0.800	5.283
a1+a2+a3+a4+d1	0.834	0.503	0.386	2.382	0.662	0.814	0.224
a1+a2+a3+a4+d1+d2	0.839	0.491	0.349	0.993	0.569	0.691	2.717
a1+a2+a3+a4+d1+d2+d3	0.900	0.397	0.241	0.978	0.769	0.908	4.125
a1+a2+a3+a4+d1+d2+d3+d4	0.923	0.347	0.228	1.274	0.695	0.815	5.770

Table 3 Statistical results of PSO-REPTree for predicting multiple decomposed parameters of SPI-12 in training phase

Sets	R	RMSE	MAE	MAPE	Kendall tau	Spearman's rho	RMSPE
a1	0.787	0.496	0.356	1.945	0.594	0.757	6.400
a1+a2	0.798	0.483	0.354	1.870	0.616	0.777	5.915
a1+a2+a3	0.829	0.449	0.318	1.456	0.639	0.802	4.961
a1+a2+a3+a4	0.851	0.422	0.312	1.451	0.647	0.814	3.905
a1+a2+a3+a4+d1	0.869	0.402	0.275	1.432	0.655	0.828	4.424
a1+a2+a3+a4+d1+d2	0.879	0.386	0.261	1.457	0.678	0.84	4.571
a1+a2+a3+a4+d1+d2+d3	0.894	0.366	0.240	1.375	0.725	0.879	4.415
a1+a2+a3+a4+d1+d2+d3+d4	0.901	0.350	0.259	1.196	0.721	0.874	3.583

Table 4 Statistical results of PSO-REPTree for predicting multiple decomposed parameters of SPI-6 in testing phase

Sets	R	RMSE	MAE	MAPE	Kendall tau	Spearman's rho	RMSPE
a1	0.600	0.513	0.412	1.689	0.424	0.536	4.645
a1+a2	0.648	0.488	0.350	0.717	0.532	0.673	1.141
a1+a2+a3	0.695	0.461	0.340	0.863	0.560	0.711	1.402
a1+a2+a3+a4	0.734	0.436	0.371	2.024	0.539	0.717	6.183
a1+a2+a3+a4+d1	0.825	0.616	0.507	2.921	0.377	0.509	8.018
a1+a2+a3+a4+d1+d2	0.839	0.471	0.417	1.629	0.550	0.709	3.110
a1+a2+a3+a4+d1+d2+d3	0.857	0.485	0.422	2.315	0.610	0.776	5.897
a1+a2+a3+a4+d1+d2+d3+d4	0.927	0.130	0.104	1.409	0.818	0.937	3.846

Table 5 Statistical results of PSO-REPTree for predicting multiple decomposed parameters of SPI-12 in testing phase

Sets	R	RMSE	MAE	MAPE	Kendall tau	Spearman's rho	RMSPE
a1	0.745	0.324	0.263	0.538	0.142	0.186	0.964
a1+a2	0.747	0.338	0.212	0.388	0.210	0.165	0.743
a1+a2+a3	0.770	0.308	0.249	0.500	0.252	0.344	0.793
a1+a2+a3+a4	0.794	0.300	0.214	0.449	0.194	0.165	0.805
a1+a2+a3+a4+d1	0.835	0.263	0.221	0.544	0.227	0.107	1.040
a1+a2+a3+a4+d1+d2	0.877	0.244	0.175	0.425	0.248	0.211	0.799
a1+a2+a3+a4+d1+d2+d3	0.8934	0.218	0.167	0.414	0.258	0.167	0.883
a1+a2+a3+a4+d1+d2+d3+d4	0.907	0.212	0.161	0.413	0.252	0.157	0.888