Table 1: Experimental Results of Metaheuristic Optimization for Parameter Tuning in Machine Learning Models.

Data	**MH library**	**ML model**	**MAE**	R^2	**Time (sec)**
California Housing	Hyperopt	GBR	0.0194	0.9994	38208
California Housing	Hyperopt	RFR	0.2310	0.9205	8352
California Housing	Hyperopt	XGBoost	0.0133	0.9997	476
California Housing	Optuna	GBR	0.9139	0	5069
California Housing	Optuna	RFR	0.2305	0.9212	19987
California Housing	Optuna	XGBoost	0.9139	0	73
California Housing	Skopt	GBR	0.1757	0.9553	27021
California Housing	Skopt	RFR	0.2307	0.9205	8443
California Housing	Skopt	XGBoost	0.1614	0.9608	14915
Diabetes	Hyperopt	GBR	0	1	126
Diabetes	Hyperopt	RFR	17.8014	0.9208	88
Diabetes	Hyperopt	XGBoost	0.0010	1	82
Diabetes	Optuna	GBR	66.4482	0	82
Diabetes	Optuna	RFR	18.2618	0.9184	126
Diabetes	Optuna	XGBoost	66.4482	0	29
Diabetes	Skopt	GBR	36.2099	0.6930	4729
Diabetes	Skopt	RFR	22.3266	0.8769	2243
Diabetes	Skopt	XGBoost	35.4242	0.6993	24356
Wine	Hyperopt	GBR	0	1	39
Wine	Hyperopt	RFR	0.0371	0.9909	40
Wine	Hyperopt	XGBoost	0.0002	1	42
Wine	Optuna	GBR	0.6115	0	35
Wine	Optuna	RFR	0.0355	0.9905	35
Wine	Optuna	XGBoost	0.6115	0	32
Wine	Skopt	GBR	0.0005	1	2530
Wine	Skopt	RFR	0.0379	0.9898	2165
Wine	Skopt	XGBoost	0.0004	1	2855