Logistic Regression

Random state 1
  {'C': 0.001, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.49884194553150707 Validation F2: 0.48915396084844404
  {'C': 0.001, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.4986809035420472 Validation F2: 0.4925506415378108
  {'C': 0.01, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5097126999673522 Validation F2: 0.5046232539838678
  {'C': 0.01, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.5102057385966906 Validation F2: 0.5052281833284472
  {'C': 0.1, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5111252591540558 Validation F2: 0.5063384433962265
  {'C': 0.1, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.5117814920505503 Validation F2: 0.5056372549019608
  {'C': 1, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5118309399477807 Validation F2: 0.5056620422569734
  {'C': 1, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.5118206588242972 Validation F2: 0.5060063741113018
  {'C': 10, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5118752446822393 Validation F2: 0.5059100495365147
  {'C': 10, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.5119150532548239 Validation F2: 0.5059348636452815
  {'C': 100, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5118566116511188 Validation F2: 0.5059844991660943
  {'C': 100, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.5119131101289975 Validation F2: 0.5060093205788571
  {'C': 0.001, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
  Train F2: 0.5010638973577236 Validation F2: 0.4947232701399169
  {'C': 0.01, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
  Train F2: 0.509653767820774 Validation F2: 0.5072321647462613
  {'C': 0.1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
  Train F2: 0.3141463648264632 Validation F2: 0.31367298634853086
  {'C': 1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
  Train F2: 0.28654278099970387 Validation F2: 0.2859706785451715
  {'C': 10, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
  Train F2: 0.28708012767158586 Validation F2: 0.28689679082970376
  {'C': 100, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
  Train F2: 0.28015753357099576 Validation F2: 0.28056810028278395
Best model parameters: {'solver': 'saga', 'penalty': 'elasticnet', 'n_jobs': -1, 'l1_ratio': 0.5, 'C': 0.01}
Corresponding validation F2 score: 0.5072321647462613
Test F2 score: 0.5010310290652004
Random state 2
  {'C': 0.001, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.4957486669548926 Validation F2: 0.49682417476662494
  {'C': 0.001, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.49623684457075046 Validation F2: 0.4963822589738771
  {'C': 0.01, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5054028065257428 Validation F2: 0.5036482052788795
  {'C': 0.01, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.5056817260775827 Validation F2: 0.5031415907651844
  {'C': 0.1, 'penalty': 'l1', 'solver': 'liblinear'}
  Train F2: 0.5066169040711888 Validation F2: 0.5042078481260397
  {'C': 0.1, 'penalty': 'l2', 'solver': 'liblinear'}
  Train F2: 0.506659936168827 Validation F2: 0.5044996576347451

{'C': 1, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5067281376254399 Validation F2: 0.5042325194500171
{'C': 1, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5067518040103598 Validation F2: 0.5044052863436124
{'C': 10, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5067848241484353 Validation F2: 0.504454670060701
{'C': 10, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.506768313541514 Validation F2: 0.5043559122944401
{'C': 100, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5067435496481626 Validation F2: 0.5043065479103455
{'C': 100, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.506768313541514 Validation F2: 0.5043559122944401
{'C': 0.001, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.49707138208542995 Validation F2: 0.5018871530266112
{'C': 0.01, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.5058308800806727 Validation F2: 0.5050332290852229
{'C': 0.1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.49280371973509124 Validation F2: 0.49124580671844126
{'C': 1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.5149811133710496 Validation F2: 0.5123150186901531
{'C': 10, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.45667168794101326 Validation F2: 0.45459978485198616
{'C': 100, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.4692720391499037 Validation F2: 0.46795247259643546
Best model parameters: {'solver': 'saga', 'penalty': 'elasticnet', 'n_jobs': -1, 'l1_ratio': 0.5, 'C': 1}
Corresponding validation F2 score: 0.5123150186901531
Test F2 score: 0.5109061257771889
Random state 3
{'C': 0.001, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.4997592681752528 Validation F2: 0.4954132846645214
{'C': 0.001, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5004786641347165 Validation F2: 0.4959102594064034
{'C': 0.01, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5113580409020779 Validation F2: 0.501435453262615
{'C': 0.01, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5124459316085856 Validation F2: 0.5032270587664386
{'C': 0.1, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5136149772947097 Validation F2: 0.503173828125
{'C': 0.1, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5139589750311292 Validation F2: 0.5030480370641307
{'C': 1, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.513974264404557 Validation F2: 0.502903713825582
{'C': 1, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5142936760318657 Validation F2: 0.5030740704596467
{'C': 10, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5141887571927408 Validation F2: 0.503098619040648
{'C': 10, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5143273991016688 Validation F2: 0.503098619040648
{'C': 100, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5142538646907427 Validation F2: 0.503098619040648
{'C': 100, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5143189679196105 Validation F2: 0.5030740704596467
{'C': 0.001, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.5022816478922679 Validation F2: 0.49652645603349826
{'C': 0.01, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}

Train F2: 0.5114287585551953 Validation F2: 0.5029887738737425
 {'C': 0.1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.5360687587109854 Validation F2: 0.5290587492103601
 {'C': 1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.4366097046949191 Validation F2: 0.43038264721606967
 {'C': 10, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.02979115479115479 Validation F2: 0.039551140544518026
 {'C': 100, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.5212526023594726 Validation F2: 0.5105406937786712
Best model parameters: {'solver': 'saga', 'penalty': 'elasticnet', 'n_jobs': -1, 'l1_ratio': 0.5, 'C': 0.1}
Corresponding validation F2 score: 0.5290587492103601
Test F2 score: 0.5180094183530609
Random state 4
 {'C': 0.001, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.5011157310044789 Validation F2: 0.4951597289448209
 {'C': 0.001, 'penalty': 'l2', 'solver': 'liblinear'}
 Train F2: 0.4999608058320922 Validation F2: 0.49884100477789867
 {'C': 0.01, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.5102391311459321 Validation F2: 0.504738868595123
 {'C': 0.01, 'penalty': 'l2', 'solver': 'liblinear'}
 Train F2: 0.511051072556232 Validation F2: 0.5039748748650505
 {'C': 0.1, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.5126021519464142 Validation F2: 0.5065069506063294
 {'C': 0.1, 'penalty': 'l2', 'solver': 'liblinear'}
 Train F2: 0.5124030500376345 Validation F2: 0.5060359694506036
 {'C': 1, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.5122035063595738 Validation F2: 0.5046618321740417
 {'C': 1, 'penalty': 'l2', 'solver': 'liblinear'}
 Train F2: 0.5124721749378028 Validation F2: 0.5045894196604817
 {'C': 10, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.512469910098744 Validation F2: 0.504220346512661
 {'C': 10, 'penalty': 'l2', 'solver': 'liblinear'}
 Train F2: 0.5125601807879999 Validation F2: 0.504220346512661
 {'C': 100, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.5126756411516163 Validation F2: 0.5042701288443501
 {'C': 100, 'penalty': 'l2', 'solver': 'liblinear'}
 Train F2: 0.5126756411516163 Validation F2: 0.5040481832543444
 {'C': 0.001, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.5022714593129832 Validation F2: 0.49858302512128344
 {'C': 0.01, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.5109989711430111 Validation F2: 0.5056955471177079
 {'C': 0.1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.5105855083818944 Validation F2: 0.5012291052114061
 {'C': 1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.35011999160515006 Validation F2: 0.34991197183098594
 {'C': 10, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.5012566540220734 Validation F2: 0.4950425261970772
 {'C': 100, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
 Train F2: 0.3874303815813992 Validation F2: 0.38842820624727226
Best model parameters: {'solver': 'liblinear', 'penalty': 'l1', 'C': 0.1}
Corresponding validation F2 score: 0.5065069506063294
Test F2 score: 0.49851778656126483
Random state 5
 {'C': 0.001, 'penalty': 'l1', 'solver': 'liblinear'}
 Train F2: 0.4918346212060862 Validation F2: 0.49507307088113484

{'C': 0.001, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.492449625208434 Validation F2: 0.4928857063145169
{'C': 0.01, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5031395386667534 Validation F2: 0.5069471434123591
{'C': 0.01, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5041255460281507 Validation F2: 0.5031856356791196
{'C': 0.1, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5054031181850731 Validation F2: 0.5032546390750996
{'C': 0.1, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.505169554898072 Validation F2: 0.5025710682060736
{'C': 1, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5051885104583456 Validation F2: 0.5027675276752768
{'C': 1, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5051630213838524 Validation F2: 0.5027431179297956
{'C': 10, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5052278972958031 Validation F2: 0.5027919397912115
{'C': 10, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5051548068167035 Validation F2: 0.5028407711358228
{'C': 100, 'penalty': 'l1', 'solver': 'liblinear'}
Train F2: 0.5052114668531196 Validation F2: 0.5028651903651904
{'C': 100, 'penalty': 'l2', 'solver': 'liblinear'}
Train F2: 0.5051548068167035 Validation F2: 0.502816354277945
{'C': 0.001, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.49465578850836417 Validation F2: 0.499787022575607
{'C': 0.01, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.5037722073497202 Validation F2: 0.5047073667863728
{'C': 0.1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.4822541116721292 Validation F2: 0.48604960141718334
{'C': 1, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.4770973093846931 Validation F2: 0.4799948038451546
{'C': 10, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.47755119712516775 Validation F2: 0.479366312699646
{'C': 100, 'l1_ratio': 0.5, 'n_jobs': -1, 'penalty': 'elasticnet', 'solver': 'saga'}
Train F2: 0.5189128054144301 Validation F2: 0.5146782590028444
Best model parameters: {'solver': 'saga', 'penalty': 'elasticnet', 'n_jobs': -1, 'l1_ratio': 0.5, 'C': 100}
Corresponding validation F2 score: 0.5146782590028444
Test F2 score: 0.5311809410876948
Average Test F2 Score: 0.511929060168882

Random Forest Classifier

Random state 1
{'max_features': 0.25, 'max_depth': 1}
Train F2: 0.4890855652059047 Validation F2: 0.4769491187892064
{'max_features': 0.5, 'max_depth': 1}
Train F2: 0.49230769230769234 Validation F2: 0.49437709945961733
{'max_features': 0.75, 'max_depth': 1}
Train F2: 0.49230769230769234 Validation F2: 0.49437709945961733
{'max_features': 1.0, 'max_depth': 1}
Train F2: 0.49230769230769234 Validation F2: 0.49437709945961733
{'max_features': 0.25, 'max_depth': 3}
Train F2: 0.48567539234247625 Validation F2: 0.47605594010453456
{'max_features': 0.5, 'max_depth': 3}

Train F2: 0.48133890948262203 Validation F2: 0.46965145663472085
 {'max_features': 0.75, 'max_depth': 3}
 Train F2: 0.47715926696818417 Validation F2: 0.4651709703212455
 {'max_features': 1.0, 'max_depth': 3}
 Train F2: 0.47783089613798274 Validation F2: 0.4651053644342235
 {'max_features': 0.25, 'max_depth': 10}
 Train F2: 0.5645919682351712 Validation F2: 0.5045967953769372
 {'max_features': 0.5, 'max_depth': 10}
 Train F2: 0.5658182575783881 Validation F2: 0.5037684497016643
 {'max_features': 0.75, 'max_depth': 10}
 Train F2: 0.5645661691199283 Validation F2: 0.5015844978959946
 {'max_features': 1.0, 'max_depth': 10}
 Train F2: 0.5643596655392065 Validation F2: 0.49966326477749573
 {'max_features': 0.25, 'max_depth': 30}
 Train F2: 0.9748366803774497 Validation F2: 0.4018414481897628
 {'max_features': 0.5, 'max_depth': 30}
 Train F2: 0.9535704138649493 Validation F2: 0.43032474462570514
 {'max_features': 0.75, 'max_depth': 30}
 Train F2: 0.9458190525376778 Validation F2: 0.4406216991097027
 {'max_features': 1.0, 'max_depth': 30}
 Train F2: 0.9421696326263358 Validation F2: 0.4417731029301277
 {'max_features': 0.25, 'max_depth': 100}
 Train F2: 0.9995037220843672 Validation F2: 0.22509824021869126
 {'max_features': 0.5, 'max_depth': 100}
 Train F2: 0.9995037220843672 Validation F2: 0.24064171122994651
 {'max_features': 0.75, 'max_depth': 100}
 Train F2: 0.9997022480273932 Validation F2: 0.2463179278821737
 {'max_features': 1.0, 'max_depth': 100}
 Train F2: 0.9997022480273932 Validation F2: 0.26038149898717083
 {'max_features': 0.25, 'max_depth': 300}
 Train F2: 0.9995037220843672 Validation F2: 0.22509824021869126
 {'max_features': 0.5, 'max_depth': 300}
 Train F2: 0.9995037220843672 Validation F2: 0.24064171122994651
 {'max_features': 0.75, 'max_depth': 300}
 Train F2: 0.9997022480273932 Validation F2: 0.2463179278821737
 {'max_features': 1.0, 'max_depth': 300}
 Train F2: 0.9997022480273932 Validation F2: 0.26038149898717083
 {'max_features': 0.25, 'max_depth': None}
 Train F2: 0.9995037220843672 Validation F2: 0.22509824021869126
 {'max_features': 0.5, 'max_depth': None}
 Train F2: 0.9995037220843672 Validation F2: 0.24064171122994651
 {'max_features': 0.75, 'max_depth': None}
 Train F2: 0.9997022480273932 Validation F2: 0.2463179278821737
 {'max_features': 1.0, 'max_depth': None}
 Train F2: 0.9997022480273932 Validation F2: 0.26038149898717083
Best model parameters: {'max_features': 0.25, 'max_depth': 10}
Corresponding validation F2 score: 0.5045967953769372
Test F2 score: 0.5053752107925801
Random state 2
 {'max_features': 0.25, 'max_depth': 1}
 Train F2: 0.4804496578690127 Validation F2: 0.4768672809253088
 {'max_features': 0.5, 'max_depth': 1}
 Train F2: 0.5039144105172086 Validation F2: 0.4917720312599276
 {'max_features': 0.75, 'max_depth': 1}
 Train F2: 0.49414934938823074 Validation F2: 0.48286718406794554

{'max_features': 1.0, 'max_depth': 1}
 Train F2: 0.49414934938823074 Validation F2: 0.48286718406794554
 {'max_features': 0.25, 'max_depth': 3}
 Train F2: 0.4751987013583669 Validation F2: 0.4763435920992191
 {'max_features': 0.5, 'max_depth': 3}
 Train F2: 0.47287977041746604 Validation F2: 0.4697747362418021
 {'max_features': 0.75, 'max_depth': 3}
 Train F2: 0.474620084599718 Validation F2: 0.47053298896454565
 {'max_features': 1.0, 'max_depth': 3}
 Train F2: 0.4747755919056704 Validation F2: 0.4706544159009938
 {'max_features': 0.25, 'max_depth': 10}
 Train F2: 0.5662189775922595 Validation F2: 0.5133059850636373
 {'max_features': 0.5, 'max_depth': 10}
 Train F2: 0.5702208268289688 Validation F2: 0.5079113924050633
 {'max_features': 0.75, 'max_depth': 10}
 Train F2: 0.5712781822966927 Validation F2: 0.508743198267209
 {'max_features': 1.0, 'max_depth': 10}
 Train F2: 0.5692508710801394 Validation F2: 0.5069765002098195
 {'max_features': 0.25, 'max_depth': 30}
 Train F2: 0.9742473703300689 Validation F2: 0.3852176636392108
 {'max_features': 0.5, 'max_depth': 30}
 Train F2: 0.9552320204870415 Validation F2: 0.4184500152858453
 {'max_features': 0.75, 'max_depth': 30}
 Train F2: 0.9462633284794965 Validation F2: 0.42805238059193096
 {'max_features': 1.0, 'max_depth': 30}
 Train F2: 0.9416851700362276 Validation F2: 0.4285283928302455
 {'max_features': 0.25, 'max_depth': 100}
 Train F2: 0.9998015036101531 Validation F2: 0.2273309973506538
 {'max_features': 0.5, 'max_depth': 100}
 Train F2: 0.9996029875189201 Validation F2: 0.2344944774851317
 {'max_features': 0.75, 'max_depth': 100}
 Train F2: 0.9997022480273932 Validation F2: 0.24366471734892786
 {'max_features': 1.0, 'max_depth': 100}
 Train F2: 0.9997022480273932 Validation F2: 0.24679379007762403
 {'max_features': 0.25, 'max_depth': 300}
 Train F2: 0.9998015036101531 Validation F2: 0.2273309973506538
 {'max_features': 0.5, 'max_depth': 300}
 Train F2: 0.9996029875189201 Validation F2: 0.2344944774851317
 {'max_features': 0.75, 'max_depth': 300}
 Train F2: 0.9997022480273932 Validation F2: 0.24366471734892786
 {'max_features': 1.0, 'max_depth': 300}
 Train F2: 0.9997022480273932 Validation F2: 0.24679379007762403
 {'max_features': 0.25, 'max_depth': None}
 Train F2: 0.9998015036101531 Validation F2: 0.2273309973506538
 {'max_features': 0.5, 'max_depth': None}
 Train F2: 0.9996029875189201 Validation F2: 0.2344944774851317
 {'max_features': 0.75, 'max_depth': None}
 Train F2: 0.9997022480273932 Validation F2: 0.24366471734892786
 {'max_features': 1.0, 'max_depth': None}
 Train F2: 0.9997022480273932 Validation F2: 0.24679379007762403
Best model parameters: {'max_features': 0.25, 'max_depth': 10}
Corresponding validation F2 score: 0.5133059850636373
Test F2 score: 0.5127401837928154
Random state 3
 {'max_features': 0.25, 'max_depth': 1}

Train F2: 0.4650249282368938 Validation F2: 0.46019338514368335
{'max_features': 0.5, 'max_depth': 1}
Train F2: 0.5042868435454122 Validation F2: 0.4971295957005008
{'max_features': 0.75, 'max_depth': 1}
Train F2: 0.49628874981807597 Validation F2: 0.4894237782640408
{'max_features': 1.0, 'max_depth': 1}
Train F2: 0.49628874981807597 Validation F2: 0.4894237782640408
{'max_features': 0.25, 'max_depth': 3}
Train F2: 0.4777267839020918 Validation F2: 0.4738318179762066
{'max_features': 0.5, 'max_depth': 3}
Train F2: 0.49567150604641763 Validation F2: 0.4836515693485818
{'max_features': 0.75, 'max_depth': 3}
Train F2: 0.49420112797683796 Validation F2: 0.4846849547793934
{'max_features': 1.0, 'max_depth': 3}
Train F2: 0.5234085550690468 Validation F2: 0.5103415751532709
{'max_features': 0.25, 'max_depth': 10}
Train F2: 0.5712762175613224 Validation F2: 0.5097241306415812
{'max_features': 0.5, 'max_depth': 10}
Train F2: 0.580079077073065 Validation F2: 0.5054306914722013
{'max_features': 0.75, 'max_depth': 10}
Train F2: 0.5779803370283484 Validation F2: 0.5041454934474459
{'max_features': 1.0, 'max_depth': 10}
Train F2: 0.5775483225552895 Validation F2: 0.5049483877833351
{'max_features': 0.25, 'max_depth': 30}
Train F2: 0.9703380641430327 Validation F2: 0.38254981320049813
{'max_features': 0.5, 'max_depth': 30}
Train F2: 0.9476001035757162 Validation F2: 0.4202349374763168
{'max_features': 0.75, 'max_depth': 30}
Train F2: 0.9406680682083626 Validation F2: 0.4287861706125517
{'max_features': 1.0, 'max_depth': 30}
Train F2: 0.9371654642774029 Validation F2: 0.43109249981305614
{'max_features': 0.25, 'max_depth': 100}
Train F2: 0.9993051764355552 Validation F2: 0.2339281140612994
{'max_features': 0.5, 'max_depth': 100}
Train F2: 0.9992058962205623 Validation F2: 0.24173676608038067
{'max_features': 0.75, 'max_depth': 100}
Train F2: 0.9993051764355552 Validation F2: 0.24633877931092865
{'max_features': 1.0, 'max_depth': 100}
Train F2: 0.9990073210075692 Validation F2: 0.2608732299393122
{'max_features': 0.25, 'max_depth': 300}
Train F2: 0.9993051764355552 Validation F2: 0.2339281140612994
{'max_features': 0.5, 'max_depth': 300}
Train F2: 0.9992058962205623 Validation F2: 0.24173676608038067
{'max_features': 0.75, 'max_depth': 300}
Train F2: 0.9993051764355552 Validation F2: 0.24633877931092865
{'max_features': 1.0, 'max_depth': 300}
Train F2: 0.9990073210075692 Validation F2: 0.2608732299393122
{'max_features': 0.25, 'max_depth': None}
Train F2: 0.9993051764355552 Validation F2: 0.2339281140612994
{'max_features': 0.5, 'max_depth': None}
Train F2: 0.9992058962205623 Validation F2: 0.24173676608038067
{'max_features': 0.75, 'max_depth': None}
Train F2: 0.9993051764355552 Validation F2: 0.24633877931092865
{'max_features': 1.0, 'max_depth': None}
Train F2: 0.9990073210075692 Validation F2: 0.2608732299393122

Best model parameters: {'max_features': 1.0, 'max_depth': 3}
Corresponding validation F2 score: 0.5103415751532709
Test F2 score: 0.5117579677919277
Random state 4
  {'max_features': 0.25, 'max_depth': 1}
  Train F2: 0.4850806712887967 Validation F2: 0.4767373668263122
  {'max_features': 0.5, 'max_depth': 1}
  Train F2: 0.4980485321567962 Validation F2: 0.4880180639522179
  {'max_features': 0.75, 'max_depth': 1}
  Train F2: 0.4980485321567962 Validation F2: 0.4880180639522179
  {'max_features': 1.0, 'max_depth': 1}
  Train F2: 0.4980485321567962 Validation F2: 0.4880180639522179
  {'max_features': 0.25, 'max_depth': 3}
  Train F2: 0.4904753568757261 Validation F2: 0.4842749121032606
  {'max_features': 0.5, 'max_depth': 3}
  Train F2: 0.476377519757412 Validation F2: 0.4673207261007631
  {'max_features': 0.75, 'max_depth': 3}
  Train F2: 0.4828994793752503 Validation F2: 0.4732211910286156
  {'max_features': 1.0, 'max_depth': 3}
  Train F2: 0.4733468597251683 Validation F2: 0.46775763756895833
  {'max_features': 0.25, 'max_depth': 10}
  Train F2: 0.5653171697352978 Validation F2: 0.5090581629409895
  {'max_features': 0.5, 'max_depth': 10}
  Train F2: 0.5702476444008546 Validation F2: 0.5039745627980922
  {'max_features': 0.75, 'max_depth': 10}
  Train F2: 0.5705050717401587 Validation F2: 0.5028628989502704
  {'max_features': 1.0, 'max_depth': 10}
  Train F2: 0.5707650941090198 Validation F2: 0.5059744104895845
  {'max_features': 0.25, 'max_depth': 30}
  Train F2: 0.9724166224238622 Validation F2: 0.40603428216861864
  {'max_features': 0.5, 'max_depth': 30}
  Train F2: 0.9496146866825348 Validation F2: 0.4342874497000987
  {'max_features': 0.75, 'max_depth': 30}
  Train F2: 0.9429260073945804 Validation F2: 0.43936996005727635
  {'max_features': 1.0, 'max_depth': 30}
  Train F2: 0.9390732798806638 Validation F2: 0.4468164794007491
  {'max_features': 0.25, 'max_depth': 100}
  Train F2: 0.9997022480273932 Validation F2: 0.23728380335690552
  {'max_features': 0.5, 'max_depth': 100}
  Train F2: 0.9998015036101531 Validation F2: 0.24697110904007455
  {'max_features': 0.75, 'max_depth': 100}
  Train F2: 0.9999007542675665 Validation F2: 0.25436598329536825
  {'max_features': 1.0, 'max_depth': 100}
  Train F2: 0.9998015036101531 Validation F2: 0.2593465813405187
  {'max_features': 0.25, 'max_depth': 300}
  Train F2: 0.9997022480273932 Validation F2: 0.23728380335690552
  {'max_features': 0.5, 'max_depth': 300}
  Train F2: 0.9998015036101531 Validation F2: 0.24697110904007455
  {'max_features': 0.75, 'max_depth': 300}
  Train F2: 0.9999007542675665 Validation F2: 0.25436598329536825
  {'max_features': 1.0, 'max_depth': 300}
  Train F2: 0.9998015036101531 Validation F2: 0.2593465813405187
  {'max_features': 0.25, 'max_depth': None}
  Train F2: 0.9997022480273932 Validation F2: 0.23728380335690552
  {'max_features': 0.5, 'max_depth': None}

Train F2: 0.9998015036101531 Validation F2: 0.24697110904007455
{'max_features': 0.75, 'max_depth': None}
Train F2: 0.9999007542675665 Validation F2: 0.25436598329536825
{'max_features': 1.0, 'max_depth': None}
Train F2: 0.9998015036101531 Validation F2: 0.2593465813405187
Best model parameters: {'max_features': 0.25, 'max_depth': 10}
Corresponding validation F2 score: 0.5090581629409895
Test F2 score: 0.5012109087080131
Random state 5
{'max_features': 0.25, 'max_depth': 1}
Train F2: 0.4728897843014982 Validation F2: 0.4807554043042707
{'max_features': 0.5, 'max_depth': 1}
Train F2: 0.49514887922382067 Validation F2: 0.4951560818083961
{'max_features': 0.75, 'max_depth': 1}
Train F2: 0.49129791004199336 Validation F2: 0.49212023931125054
{'max_features': 1.0, 'max_depth': 1}
Train F2: 0.49129791004199336 Validation F2: 0.49212023931125054
{'max_features': 0.25, 'max_depth': 3}
Train F2: 0.48688895030318796 Validation F2: 0.4911061430793157
{'max_features': 0.5, 'max_depth': 3}
Train F2: 0.5008051238443306 Validation F2: 0.5034065102195306
{'max_features': 0.75, 'max_depth': 3}
Train F2: 0.5013624981587863 Validation F2: 0.5012386457473162
{'max_features': 1.0, 'max_depth': 3}
Train F2: 0.5116885137500486 Validation F2: 0.5094559208612162
{'max_features': 0.25, 'max_depth': 10}
Train F2: 0.5653905537230682 Validation F2: 0.511709724847721
{'max_features': 0.5, 'max_depth': 10}
Train F2: 0.5644347826086956 Validation F2: 0.5057057995935594
{'max_features': 0.75, 'max_depth': 10}
Train F2: 0.560453942723312 Validation F2: 0.5085793785747411
{'max_features': 1.0, 'max_depth': 10}
Train F2: 0.5556981080433816 Validation F2: 0.503844182470528
{'max_features': 0.25, 'max_depth': 30}
Train F2: 0.973823508084983 Validation F2: 0.39489102413873917
{'max_features': 0.5, 'max_depth': 30}
Train F2: 0.9518297148527014 Validation F2: 0.4245498931949954
{'max_features': 0.75, 'max_depth': 30}
Train F2: 0.9449031289581086 Validation F2: 0.4291129643669447
{'max_features': 1.0, 'max_depth': 30}
Train F2: 0.941187466411197 Validation F2: 0.42914246926615884
{'max_features': 0.25, 'max_depth': 100}
Train F2: 0.9996029875189201 Validation F2: 0.23061783330480917
{'max_features': 0.5, 'max_depth': 100}
Train F2: 0.9996029875189201 Validation F2: 0.24054398640034
{'max_features': 0.75, 'max_depth': 100}
Train F2: 0.9997022480273932 Validation F2: 0.24397488119484045
{'max_features': 1.0, 'max_depth': 100}
Train F2: 0.9995037220843672 Validation F2: 0.24748286657077587
{'max_features': 0.25, 'max_depth': 300}
Train F2: 0.9996029875189201 Validation F2: 0.23061783330480917
{'max_features': 0.5, 'max_depth': 300}
Train F2: 0.9996029875189201 Validation F2: 0.24054398640034
{'max_features': 0.75, 'max_depth': 300}
Train F2: 0.9997022480273932 Validation F2: 0.24397488119484045

{'max_features': 1.0, 'max_depth': 300}
 Train F2: 0.9995037220843672 Validation F2: 0.24748286657077587
 {'max_features': 0.25, 'max_depth': None}
 Train F2: 0.9996029875189201 Validation F2: 0.23061783330480917
 {'max_features': 0.5, 'max_depth': None}
 Train F2: 0.9996029875189201 Validation F2: 0.24054398640034
 {'max_features': 0.75, 'max_depth': None}
 Train F2: 0.9997022480273932 Validation F2: 0.24397488119484045
 {'max_features': 1.0, 'max_depth': None}
 Train F2: 0.9995037220843672 Validation F2: 0.24748286657077587
Best model parameters: {'max_features': 0.25, 'max_depth': 10}
Corresponding validation F2 score: 0.511709724847721
Test F2 score: 0.5183505589538072
Average Test F2 Score: 0.5098869660078287

SVC

Random state 1
 {'C': 0.01, 'gamma': 'scale'}
 Train F2: 0.4594017094017094 Validation F2: 0.4355400696864111
 {'C': 0.01, 'gamma': 'auto'}
 Train F2: 0.4561248126447745 Validation F2: 0.43354943273906
 {'C': 0.1, 'gamma': 'scale'}
 Train F2: 0.5155529953917051 Validation F2: 0.4905335628227194
 {'C': 0.1, 'gamma': 'auto'}
 Train F2: 0.5149162239476911 Validation F2: 0.48851978505129456
 {'C': 1.0, 'gamma': 'scale'}
 Train F2: 0.5462822458270106 Validation F2: 0.4941713127217435
 {'C': 1.0, 'gamma': 'auto'}
 Train F2: 0.5400919305413687 Validation F2: 0.4992339121552605
 {'C': 10.0, 'gamma': 'scale'}
 Train F2: 0.6342697609492235 Validation F2: 0.48332019963225636
 {'C': 10.0, 'gamma': 'auto'}
 Train F2: 0.6055674518201285 Validation F2: 0.4858404780462458
 {'C': 100.0, 'gamma': 'scale'}
 Train F2: 0.8121390211774242 Validation F2: 0.4213397999393756
 {'C': 100.0, 'gamma': 'auto'}
 Train F2: 0.7603864734299517 Validation F2: 0.4340277777777778
Best model parameters: {'gamma': 'auto', 'C': 1.0}
Corresponding validation F2 score: 0.4992339121552605
Test F2 score: 0.5171974522292994
Random state 2
 {'C': 0.01, 'gamma': 'scale'}
 Train F2: 0.4505764376833345 Validation F2: 0.4665438919582566
 {'C': 0.01, 'gamma': 'auto'}
 Train F2: 0.4448853318985809 Validation F2: 0.46198948645369997
 {'C': 0.1, 'gamma': 'scale'}
 Train F2: 0.5045834015387134 Validation F2: 0.5329576084293065
 {'C': 0.1, 'gamma': 'auto'}
 Train F2: 0.500693141971785 Validation F2: 0.5351906158357771
 {'C': 1.0, 'gamma': 'scale'}
 Train F2: 0.5375582944703531 Validation F2: 0.5316770186335403
 {'C': 1.0, 'gamma': 'auto'}

Train F2: 0.5325542570951586 Validation F2: 0.5312266733018164
  {'C': 10.0, 'gamma': 'scale'}
  Train F2: 0.624131341209173 Validation F2: 0.5183557394002068
  {'C': 10.0, 'gamma': 'auto'}
  Train F2: 0.5954816709292413 Validation F2: 0.5287851889424297
  {'C': 100.0, 'gamma': 'scale'}
  Train F2: 0.8069251797104384 Validation F2: 0.446619761394922
  {'C': 100.0, 'gamma': 'auto'}
  Train F2: 0.7578094870806016 Validation F2: 0.47432550043516103
Best model parameters: {'gamma': 'auto', 'C': 0.1}
Corresponding validation F2 score: 0.5351906158357771
Test F2 score: 0.5061609084319884
Random state 3
  {'C': 0.01, 'gamma': 'scale'}
  Train F2: 0.4556525268926324 Validation F2: 0.4514533085961657
  {'C': 0.01, 'gamma': 'auto'}
  Train F2: 0.4515330030793948 Validation F2: 0.4509283819628647
  {'C': 0.1, 'gamma': 'scale'}
  Train F2: 0.5204778156996587 Validation F2: 0.4906832298136646
  {'C': 0.1, 'gamma': 'auto'}
  Train F2: 0.5179652805813484 Validation F2: 0.49150036954915005
  {'C': 1.0, 'gamma': 'scale'}
  Train F2: 0.5504356568364611 Validation F2: 0.5024228513134404
  {'C': 1.0, 'gamma': 'auto'}
  Train F2: 0.5459890802183957 Validation F2: 0.4960266598308126
  {'C': 10.0, 'gamma': 'scale'}
  Train F2: 0.629207664422579 Validation F2: 0.4935339139614674
  {'C': 10.0, 'gamma': 'auto'}
  Train F2: 0.6038054968287526 Validation F2: 0.4893837389953392
  {'C': 100.0, 'gamma': 'scale'}
  Train F2: 0.8100530179445351 Validation F2: 0.41718555417185554
  {'C': 100.0, 'gamma': 'auto'}
  Train F2: 0.7606372644258792 Validation F2: 0.4280618311533888
Best model parameters: {'gamma': 'scale', 'C': 1.0}
Corresponding validation F2 score: 0.5024228513134404
Test F2 score: 0.5031367628607277
Random state 4
  {'C': 0.01, 'gamma': 'scale'}
  Train F2: 0.45355340335561317 Validation F2: 0.4580152671755725
  {'C': 0.01, 'gamma': 'auto'}
  Train F2: 0.44877422840548387 Validation F2: 0.4544528224984716
  {'C': 0.1, 'gamma': 'scale'}
  Train F2: 0.5088956563551851 Validation F2: 0.5068392769907182
  {'C': 0.1, 'gamma': 'auto'}
  Train F2: 0.507033298895335 Validation F2: 0.5053320407174018
  {'C': 1.0, 'gamma': 'scale'}
  Train F2: 0.5401234567901234 Validation F2: 0.5244399185336049
  {'C': 1.0, 'gamma': 'auto'}
  Train F2: 0.5342716748563338 Validation F2: 0.5213631739572736
  {'C': 10.0, 'gamma': 'scale'}
  Train F2: 0.6256481161424127 Validation F2: 0.5095036958817318
  {'C': 10.0, 'gamma': 'auto'}
  Train F2: 0.5974225484338994 Validation F2: 0.5142632818633865
  {'C': 100.0, 'gamma': 'scale'}
  Train F2: 0.8054097698829229 Validation F2: 0.4153986609860012

{'C': 100.0, 'gamma': 'auto'}
  Train F2: 0.7614873326269146 Validation F2: 0.42857142857142855
Best model parameters: {'gamma': 'scale', 'C': 1.0}
Corresponding validation F2 score: 0.5244399185336049
Test F2 score: 0.5092824887104868
Random state 5
  {'C': 0.01, 'gamma': 'scale'}
  Train F2: 0.44464609800362975 Validation F2: 0.46204952687739076
  {'C': 0.01, 'gamma': 'auto'}
  Train F2: 0.44184039304209266 Validation F2: 0.4576271186440678
  {'C': 0.1, 'gamma': 'scale'}
  Train F2: 0.5007262750161394 Validation F2: 0.5237750422399228
  {'C': 0.1, 'gamma': 'auto'}
  Train F2: 0.501648042447142 Validation F2: 0.5241644626112046
  {'C': 1.0, 'gamma': 'scale'}
  Train F2: 0.5337125648318555 Validation F2: 0.534504391468005
  {'C': 1.0, 'gamma': 'auto'}
  Train F2: 0.5301052631578947 Validation F2: 0.5362099419631592
  {'C': 10.0, 'gamma': 'scale'}
  Train F2: 0.6254893431926924 Validation F2: 0.5005186721991701
  {'C': 10.0, 'gamma': 'auto'}
  Train F2: 0.6013467439481759 Validation F2: 0.5102817974105103
  {'C': 100.0, 'gamma': 'scale'}
  Train F2: 0.8080194410692588 Validation F2: 0.4351145038167939
  {'C': 100.0, 'gamma': 'auto'}
  Train F2: 0.7651676681527427 Validation F2: 0.4570596797671033
Best model parameters: {'gamma': 'auto', 'C': 1.0}
Corresponding validation F2 score: 0.5362099419631592
Test F2 score: 0.5073547743704812
Average Test F2 Score: 0.5086264773205966

XGBoost

Random state 1
  {'max_depth': 5, 'learning_rate': 0.001}
  Train F2: 0.47171791373701333 Validation F2: 0.4577132323186907
  {'max_depth': 10, 'learning_rate': 0.001}
  Train F2: 0.5382933563141348 Validation F2: 0.47165282511641304
  {'max_depth': 30, 'learning_rate': 0.001}
  Train F2: 0.8418633799874661 Validation F2: 0.4482801829459307
  {'max_depth': 100, 'learning_rate': 0.001}
  Train F2: 0.8610743130635443 Validation F2: 0.44339864259188116
  {'max_depth': 300, 'learning_rate': 0.001}
  Train F2: 0.8610743130635443 Validation F2: 0.44339864259188116
  {'max_depth': None, 'learning_rate': 0.001}
  Train F2: 0.46484923233955683 Validation F2: 0.44588155207624236
  {'max_depth': 5, 'learning_rate': 0.01}
  Train F2: 0.5052726919842143 Validation F2: 0.49313935383417673
  {'max_depth': 10, 'learning_rate': 0.01}
  Train F2: 0.5686177657034659 Validation F2: 0.4882347100873709
  {'max_depth': 30, 'learning_rate': 0.01}
  Train F2: 0.9139455782312925 Validation F2: 0.45064377682403434
  {'max_depth': 100, 'learning_rate': 0.01}

Train F2: 0.923875670471737 Validation F2: 0.4485542750672831
 {'max_depth': 300, 'learning_rate': 0.01}
Train F2: 0.923875670471737 Validation F2: 0.4485542750672831
 {'max_depth': None, 'learning_rate': 0.01}
Train F2: 0.50632313337638 Validation F2: 0.4897261899112609
 {'max_depth': 5, 'learning_rate': 0.1}
Train F2: 0.5335248427269226 Validation F2: 0.5012083131947801
 {'max_depth': 10, 'learning_rate': 0.1}
Train F2: 0.7360061979469301 Validation F2: 0.4871068455134135
 {'max_depth': 30, 'learning_rate': 0.1}
Train F2: 1.0 Validation F2: 0.40886319845857416
 {'max_depth': 100, 'learning_rate': 0.1}
Train F2: 1.0 Validation F2: 0.4089434661723818
 {'max_depth': 300, 'learning_rate': 0.1}
Train F2: 1.0 Validation F2: 0.4089434661723818
 {'max_depth': None, 'learning_rate': 0.1}
Train F2: 0.5534056996687764 Validation F2: 0.5024878072811468
 {'max_depth': 5, 'learning_rate': 1}
Train F2: 0.6651421046074995 Validation F2: 0.45420640417710056
 {'max_depth': 10, 'learning_rate': 1}
Train F2: 0.9993553346061342 Validation F2: 0.3334597875569044
 {'max_depth': 30, 'learning_rate': 1}
Train F2: 1.0 Validation F2: 0.36032515241519464
 {'max_depth': 100, 'learning_rate': 1}
Train F2: 1.0 Validation F2: 0.35450690954773867
 {'max_depth': 300, 'learning_rate': 1}
Train F2: 1.0 Validation F2: 0.35450690954773867
 {'max_depth': None, 'learning_rate': 1}
Train F2: 0.7513950355974601 Validation F2: 0.4288114967839138
 {'max_depth': 5, 'learning_rate': 10}
Train F2: 0.3177076415354592 Validation F2: 0.31758907799681646
 {'max_depth': 10, 'learning_rate': 10}
Train F2: 0.43816636288852684 Validation F2: 0.43717711277902327
 {'max_depth': 30, 'learning_rate': 10}
Train F2: 0.0 Validation F2: 0.0
 {'max_depth': 100, 'learning_rate': 10}
Train F2: 0.8606513614522157 Validation F2: 0.44642283216558465
 {'max_depth': 300, 'learning_rate': 10}
Train F2: 0.8606513614522157 Validation F2: 0.44642283216558465
 {'max_depth': None, 'learning_rate': 10}
Train F2: 0.33367740304607024 Validation F2: 0.33310157385753114
 {'max_depth': 5, 'learning_rate': 100}
Train F2: 0.4707618025751073 Validation F2: 0.456515909903468
 {'max_depth': 10, 'learning_rate': 100}
Train F2: 0.06206262811903584 Validation F2: 0.06554981362250084
 {'max_depth': 30, 'learning_rate': 100}
Train F2: 0.8359781774431099 Validation F2: 0.4525902375163643
 {'max_depth': 100, 'learning_rate': 100}
Train F2: 0.8606513614522157 Validation F2: 0.44642283216558465
 {'max_depth': 300, 'learning_rate': 100}
Train F2: 0.8606513614522157 Validation F2: 0.44642283216558465
 {'max_depth': None, 'learning_rate': 100}
Train F2: 0.22409469745408853 Validation F2: 0.2240959434214038
Best model parameters: {'max_depth': None, 'learning_rate': 0.1}
Corresponding validation F2 score: 0.5024878072811468

Test F2 score: 0.501180986123413
Random state 2
  {'max_depth': 5, 'learning_rate': 0.001}
  Train F2: 0.4706575923106773 Validation F2: 0.4628469113697404
  {'max_depth': 10, 'learning_rate': 0.001}
  Train F2: 0.5316793953481017 Validation F2: 0.4785864173979397
  {'max_depth': 30, 'learning_rate': 0.001}
  Train F2: 0.8405694247307339 Validation F2: 0.4325581395348837
  {'max_depth': 100, 'learning_rate': 0.001}
  Train F2: 0.8625120462576293 Validation F2: 0.43314082629942247
  {'max_depth': 300, 'learning_rate': 0.001}
  Train F2: 0.8625120462576293 Validation F2: 0.43314082629942247
  {'max_depth': None, 'learning_rate': 0.001}
  Train F2: 0.4699187468833416 Validation F2: 0.46233480176211456
  {'max_depth': 5, 'learning_rate': 0.01}
  Train F2: 0.5011594949755218 Validation F2: 0.4969500387296669
  {'max_depth': 10, 'learning_rate': 0.01}
  Train F2: 0.576 Validation F2: 0.4965485967652542
  {'max_depth': 30, 'learning_rate': 0.01}
  Train F2: 0.9135933993698574 Validation F2: 0.44143653924636106
  {'max_depth': 100, 'learning_rate': 0.01}
  Train F2: 0.9228391528334288 Validation F2: 0.4392658280057744
  {'max_depth': 300, 'learning_rate': 0.01}
  Train F2: 0.9228391528334288 Validation F2: 0.4392658280057744
  {'max_depth': None, 'learning_rate': 0.01}
  Train F2: 0.504025201260063 Validation F2: 0.4945818948983506
  {'max_depth': 5, 'learning_rate': 0.1}
  Train F2: 0.5292055513758384 Validation F2: 0.49966320246343343
  {'max_depth': 10, 'learning_rate': 0.1}
  Train F2: 0.7432735644742747 Validation F2: 0.49614336252392277
  {'max_depth': 30, 'learning_rate': 0.1}
  Train F2: 1.0 Validation F2: 0.3997216638317613
  {'max_depth': 100, 'learning_rate': 0.1}
  Train F2: 1.0 Validation F2: 0.3980176552578597
  {'max_depth': 300, 'learning_rate': 0.1}
  Train F2: 1.0 Validation F2: 0.3980176552578597
  {'max_depth': None, 'learning_rate': 0.1}
  Train F2: 0.5508502235712653 Validation F2: 0.5012285012285013
  {'max_depth': 5, 'learning_rate': 1}
  Train F2: 0.6499657311565296 Validation F2: 0.4527841180529752
  {'max_depth': 10, 'learning_rate': 1}
  Train F2: 0.9996279761904762 Validation F2: 0.35069837674594184
  {'max_depth': 30, 'learning_rate': 1}
  Train F2: 1.0 Validation F2: 0.33955457967377667
  {'max_depth': 100, 'learning_rate': 1}
  Train F2: 1.0 Validation F2: 0.3462353772473895
  {'max_depth': 300, 'learning_rate': 1}
  Train F2: 1.0 Validation F2: 0.3462353772473895
  {'max_depth': None, 'learning_rate': 1}
  Train F2: 0.7640284961452133 Validation F2: 0.42331144465290804
  {'max_depth': 5, 'learning_rate': 10}
  Train F2: 0.29920480955765133 Validation F2: 0.29952593018244505
  {'max_depth': 10, 'learning_rate': 10}
  Train F2: 0.27298146493326797 Validation F2: 0.2727194176225347
  {'max_depth': 30, 'learning_rate': 10}

Train F2: 0.0 Validation F2: 0.0
 {'max_depth': 100, 'learning_rate': 10}
 Train F2: 0.8654300821046297 Validation F2: 0.4279063835214591
 {'max_depth': 300, 'learning_rate': 10}
 Train F2: 0.8654300821046297 Validation F2: 0.4279063835214591
 {'max_depth': None, 'learning_rate': 10}
 Train F2: 0.3053627460302368 Validation F2: 0.30475133088507417
 {'max_depth': 5, 'learning_rate': 100}
 Train F2: 0.0955619393797268 Validation F2: 0.10077944889669557
 {'max_depth': 10, 'learning_rate': 100}
 Train F2: 0.08437931381242744 Validation F2: 0.08387646783818717
 {'max_depth': 30, 'learning_rate': 100}
 Train F2: 0.8339202850513755 Validation F2: 0.42894120547269815
 {'max_depth': 100, 'learning_rate': 100}
 Train F2: 0.8654300821046297 Validation F2: 0.4279063835214591
 {'max_depth': 300, 'learning_rate': 100}
 Train F2: 0.8654300821046297 Validation F2: 0.4279063835214591
 {'max_depth': None, 'learning_rate': 100}
 Train F2: 0.1015599668552077 Validation F2: 0.1042385305277682
Best model parameters: {'max_depth': None, 'learning_rate': 0.1}
Corresponding validation F2 score: 0.5012285012285013
Test F2 score: 0.5019201788926159
Random state 3
 {'max_depth': 5, 'learning_rate': 0.001}
 Train F2: 0.46932258017042194 Validation F2: 0.46686548835577385
 {'max_depth': 10, 'learning_rate': 0.001}
 Train F2: 0.5466116946434999 Validation F2: 0.47400760752950355
 {'max_depth': 30, 'learning_rate': 0.001}
 Train F2: 0.8510548434101324 Validation F2: 0.4380550481829061
 {'max_depth': 100, 'learning_rate': 0.001}
 Train F2: 0.8609420057673822 Validation F2: 0.43950790413054563
 {'max_depth': 300, 'learning_rate': 0.001}
 Train F2: 0.8609420057673822 Validation F2: 0.43950790413054563
 {'max_depth': None, 'learning_rate': 0.001}
 Train F2: 0.5059457226935586 Validation F2: 0.49026639344262296
 {'max_depth': 5, 'learning_rate': 0.01}
 Train F2: 0.5059417513555635 Validation F2: 0.49951667472208794
 {'max_depth': 10, 'learning_rate': 0.01}
 Train F2: 0.5826567510404584 Validation F2: 0.49017117895057655
 {'max_depth': 30, 'learning_rate': 0.01}
 Train F2: 0.9120016291804317 Validation F2: 0.4542072510822511
 {'max_depth': 100, 'learning_rate': 0.01}
 Train F2: 0.9201424559961646 Validation F2: 0.45242505316594633
 {'max_depth': 300, 'learning_rate': 0.01}
 Train F2: 0.9201424559961646 Validation F2: 0.45242505316594633
 {'max_depth': None, 'learning_rate': 0.01}
 Train F2: 0.5146864468380361 Validation F2: 0.5006895872327849
 {'max_depth': 5, 'learning_rate': 0.1}
 Train F2: 0.5357403769664107 Validation F2: 0.5040147044597079
 {'max_depth': 10, 'learning_rate': 0.1}
 Train F2: 0.7416867281232262 Validation F2: 0.49050908457653686
 {'max_depth': 30, 'learning_rate': 0.1}
 Train F2: 1.0 Validation F2: 0.41009463722397477
 {'max_depth': 100, 'learning_rate': 0.1}
 Train F2: 1.0 Validation F2: 0.4103273397879207

{'max_depth': 300, 'learning_rate': 0.1}
 Train F2: 1.0 Validation F2: 0.4103273397879207
 {'max_depth': None, 'learning_rate': 0.1}
 Train F2: 0.5595907334626802 Validation F2: 0.5072642814785531
 {'max_depth': 5, 'learning_rate': 1}
 Train F2: 0.6662731630535881 Validation F2: 0.46500970455035584
 {'max_depth': 10, 'learning_rate': 1}
 Train F2: 0.9999007665781835 Validation F2: 0.34554537885095754
 {'max_depth': 30, 'learning_rate': 1}
 Train F2: 1.0 Validation F2: 0.3503059783461478
 {'max_depth': 100, 'learning_rate': 1}
 Train F2: 1.0 Validation F2: 0.3477715986527767
 {'max_depth': 300, 'learning_rate': 1}
 Train F2: 1.0 Validation F2: 0.3477715986527767
 {'max_depth': None, 'learning_rate': 1}
 Train F2: 0.7554791078814116 Validation F2: 0.4377290442673492
 {'max_depth': 5, 'learning_rate': 10}
 Train F2: 0.06109881319348187 Validation F2: 0.06141588513569591
 {'max_depth': 10, 'learning_rate': 10}
 Train F2: 0.3225086024351509 Validation F2: 0.32544088028687923
 {'max_depth': 30, 'learning_rate': 10}
 Train F2: 0.22409469745408853 Validation F2: 0.2240959434214038
 {'max_depth': 100, 'learning_rate': 10}
 Train F2: 0.8583051136242625 Validation F2: 0.4418870803662258
 {'max_depth': 300, 'learning_rate': 10}
 Train F2: 0.8583051136242625 Validation F2: 0.4418870803662258
 {'max_depth': None, 'learning_rate': 10}
 Train F2: 0.38631611663652804 Validation F2: 0.3897662665824384
 {'max_depth': 5, 'learning_rate': 100}
 Train F2: 0.15676280693322878 Validation F2: 0.15605422029843946
 {'max_depth': 10, 'learning_rate': 100}
 Train F2: 0.09944691465133934 Validation F2: 0.10132129916903516
 {'max_depth': 30, 'learning_rate': 100}
 Train F2: 0.8396214616250469 Validation F2: 0.4416796267496112
 {'max_depth': 100, 'learning_rate': 100}
 Train F2: 0.8583051136242625 Validation F2: 0.4418870803662258
 {'max_depth': 300, 'learning_rate': 100}
 Train F2: 0.8583051136242625 Validation F2: 0.4418870803662258
 {'max_depth': None, 'learning_rate': 100}
 Train F2: 0.01430383106733123 Validation F2: 0.015460729746444033
Best model parameters: {'max_depth': None, 'learning_rate': 0.1}
Corresponding validation F2 score: 0.5072642814785531
Test F2 score: 0.5007715665289462
Random state 4
 {'max_depth': 5, 'learning_rate': 0.001}
 Train F2: 0.47750895791998577 Validation F2: 0.4697716077026422
 {'max_depth': 10, 'learning_rate': 0.001}
 Train F2: 0.5442165763176801 Validation F2: 0.4869042930287515
 {'max_depth': 30, 'learning_rate': 0.001}
 Train F2: 0.8513967898153827 Validation F2: 0.44551019120338237
 {'max_depth': 100, 'learning_rate': 0.001}
 Train F2: 0.8658785599140247 Validation F2: 0.4420633902219941
 {'max_depth': 300, 'learning_rate': 0.001}
 Train F2: 0.8658785599140247 Validation F2: 0.4420633902219941
 {'max_depth': None, 'learning_rate': 0.001}

Train F2: 0.47782667816881846 Validation F2: 0.4709680272409676
 {'max_depth': 5, 'learning_rate': 0.01}
Train F2: 0.5029873337050904 Validation F2: 0.4936782163883795
 {'max_depth': 10, 'learning_rate': 0.01}
Train F2: 0.5789921433218236 Validation F2: 0.4928585797626232
 {'max_depth': 30, 'learning_rate': 0.01}
Train F2: 0.915169955268954 Validation F2: 0.4466313398940197
 {'max_depth': 100, 'learning_rate': 0.01}
Train F2: 0.9243418035042656 Validation F2: 0.44105351170568563
 {'max_depth': 300, 'learning_rate': 0.01}
Train F2: 0.9243418035042656 Validation F2: 0.44105351170568563
 {'max_depth': None, 'learning_rate': 0.01}
Train F2: 0.5081056859826844 Validation F2: 0.4952624963743595
 {'max_depth': 5, 'learning_rate': 0.1}
Train F2: 0.5386979377274566 Validation F2: 0.5036831064929996
 {'max_depth': 10, 'learning_rate': 0.1}
Train F2: 0.7513645109357208 Validation F2: 0.49961972737377874
 {'max_depth': 30, 'learning_rate': 0.1}
Train F2: 1.0 Validation F2: 0.4119864594553008
 {'max_depth': 100, 'learning_rate': 0.1}
Train F2: 1.0 Validation F2: 0.40625
 {'max_depth': 300, 'learning_rate': 0.1}
Train F2: 1.0 Validation F2: 0.40625
 {'max_depth': None, 'learning_rate': 0.1}
Train F2: 0.5642909381025197 Validation F2: 0.5069319768601636
 {'max_depth': 5, 'learning_rate': 1}
Train F2: 0.6602952409713464 Validation F2: 0.457240532022862
 {'max_depth': 10, 'learning_rate': 1}
Train F2: 0.9996279761904762 Validation F2: 0.3456966596448992
 {'max_depth': 30, 'learning_rate': 1}
Train F2: 1.0 Validation F2: 0.3435925692695214
 {'max_depth': 100, 'learning_rate': 1}
Train F2: 1.0 Validation F2: 0.34751606331296037
 {'max_depth': 300, 'learning_rate': 1}
Train F2: 1.0 Validation F2: 0.34751606331296037
 {'max_depth': None, 'learning_rate': 1}
Train F2: 0.7538387252535007 Validation F2: 0.4260324098274961
 {'max_depth': 5, 'learning_rate': 10}
Train F2: 0.3221814071771687 Validation F2: 0.33206831119544594
 {'max_depth': 10, 'learning_rate': 10}
Train F2: 0.2976301403901106 Validation F2: 0.2995397088717026
 {'max_depth': 30, 'learning_rate': 10}
Train F2: 0.22550055054942586 Validation F2: 0.22538462834706705
 {'max_depth': 100, 'learning_rate': 10}
Train F2: 0.8696356100509455 Validation F2: 0.43086236877696915
 {'max_depth': 300, 'learning_rate': 10}
Train F2: 0.8696356100509455 Validation F2: 0.43086236877696915
 {'max_depth': None, 'learning_rate': 10}
Train F2: 0.32958845101577505 Validation F2: 0.32953436497978533
 {'max_depth': 5, 'learning_rate': 100}
Train F2: 0.0639909381392754 Validation F2: 0.06450554166982252
 {'max_depth': 10, 'learning_rate': 100}
Train F2: 0.3245493953912845 Validation F2: 0.32288781163434904
 {'max_depth': 30, 'learning_rate': 100}
Train F2: 0.8437067773167358 Validation F2: 0.4358429214607304

{'max_depth': 100, 'learning_rate': 100}
 Train F2: 0.8696356100509455 Validation F2: 0.43086236877696915
 {'max_depth': 300, 'learning_rate': 100}
 Train F2: 0.8696356100509455 Validation F2: 0.43086236877696915
 {'max_depth': None, 'learning_rate': 100}
 Train F2: 0.08901295691562204 Validation F2: 0.08111844019788535
Best model parameters: {'max_depth': None, 'learning_rate': 0.1}
Corresponding validation F2 score: 0.5069319768601636
Test F2 score: 0.4938302195351603
Random state 5
 {'max_depth': 5, 'learning_rate': 0.001}
 Train F2: 0.49688457070440384 Validation F2: 0.4867999790059308
 {'max_depth': 10, 'learning_rate': 0.001}
 Train F2: 0.5173470169257869 Validation F2: 0.462750321513871
 {'max_depth': 30, 'learning_rate': 0.001}
 Train F2: 0.8621574793043701 Validation F2: 0.4369925196598683
 {'max_depth': 100, 'learning_rate': 0.001}
 Train F2: 0.8703491761860546 Validation F2: 0.436564274651523
 {'max_depth': 300, 'learning_rate': 0.001}
 Train F2: 0.8703491761860546 Validation F2: 0.436564274651523
 {'max_depth': None, 'learning_rate': 0.001}
 Train F2: 0.4777319557151937 Validation F2: 0.4686048055223683
 {'max_depth': 5, 'learning_rate': 0.01}
 Train F2: 0.4969734325857791 Validation F2: 0.4942203349846662
 {'max_depth': 10, 'learning_rate': 0.01}
 Train F2: 0.5607438220351524 Validation F2: 0.48651846009759947
 {'max_depth': 30, 'learning_rate': 0.01}
 Train F2: 0.9177330479530034 Validation F2: 0.44296864302341504
 {'max_depth': 100, 'learning_rate': 0.01}
 Train F2: 0.9212360860323192 Validation F2: 0.43993115318416526
 {'max_depth': 300, 'learning_rate': 0.01}
 Train F2: 0.9212360860323192 Validation F2: 0.43993115318416526
 {'max_depth': None, 'learning_rate': 0.01}
 Train F2: 0.49905366723498773 Validation F2: 0.49327039910271986
 {'max_depth': 5, 'learning_rate': 0.1}
 Train F2: 0.5282368041071716 Validation F2: 0.5045783594611438
 {'max_depth': 10, 'learning_rate': 0.1}
 Train F2: 0.7522793366344416 Validation F2: 0.48734549735138316
 {'max_depth': 30, 'learning_rate': 0.1}
 Train F2: 1.0 Validation F2: 0.40750173651308175
 {'max_depth': 100, 'learning_rate': 0.1}
 Train F2: 1.0 Validation F2: 0.4100958565244279
 {'max_depth': 300, 'learning_rate': 0.1}
 Train F2: 1.0 Validation F2: 0.4100958565244279
 {'max_depth': None, 'learning_rate': 0.1}
 Train F2: 0.5510070411003766 Validation F2: 0.5031016460704343
 {'max_depth': 5, 'learning_rate': 1}
 Train F2: 0.6523879862136879 Validation F2: 0.4634698389304137
 {'max_depth': 10, 'learning_rate': 1}
 Train F2: 0.999652769165902 Validation F2: 0.33956433255445845
 {'max_depth': 30, 'learning_rate': 1}
 Train F2: 1.0 Validation F2: 0.3510354565422027
 {'max_depth': 100, 'learning_rate': 1}
 Train F2: 1.0 Validation F2: 0.3502909262462651
 {'max_depth': 300, 'learning_rate': 1}

Train F2: 1.0 Validation F2: 0.3502909262462651
 {'max_depth': None, 'learning_rate': 1}
 Train F2: 0.7495243403224876 Validation F2: 0.4425087108013937
 {'max_depth': 5, 'learning_rate': 10}
 Train F2: 0.46065259117082535 Validation F2: 0.4548640664897612
 {'max_depth': 10, 'learning_rate': 10}
 Train F2: 0.3241432870595088 Validation F2: 0.32130712927208804
 {'max_depth': 30, 'learning_rate': 10}
 Train F2: 0.22409469745408853 Validation F2: 0.2240959434214038
 {'max_depth': 100, 'learning_rate': 10}
 Train F2: 0.8684176506076015 Validation F2: 0.4197419934535652
 {'max_depth': 300, 'learning_rate': 10}
 Train F2: 0.8684176506076015 Validation F2: 0.4197419934535652
 {'max_depth': None, 'learning_rate': 10}
 Train F2: 0.28738181717359357 Validation F2: 0.29888718818516524
 {'max_depth': 5, 'learning_rate': 100}
 Train F2: 0.49698026165196413 Validation F2: 0.48510794768083204
 {'max_depth': 10, 'learning_rate': 100}
 Train F2: 0.24506573945482377 Validation F2: 0.2514995585056176
 {'max_depth': 30, 'learning_rate': 100}
 Train F2: 0.8536094273239795 Validation F2: 0.4215345753078623
 {'max_depth': 100, 'learning_rate': 100}
 Train F2: 0.8684176506076015 Validation F2: 0.4197419934535652
 {'max_depth': 300, 'learning_rate': 100}
 Train F2: 0.8684176506076015 Validation F2: 0.4197419934535652
 {'max_depth': None, 'learning_rate': 100}
 Train F2: 0.11751461114547211 Validation F2: 0.11406804424963474
Best model parameters: {'max_depth': 5, 'learning_rate': 0.1}
Corresponding validation F2 score: 0.5045783594611438
Test F2 score: 0.5093394954746775
Average Test F2 Score: 0.5014084893109626