

KNN CLAS

Eduardo Henrique Basilio de Carvalho
Departamento de Engenharia Eletrônica
Universidade Federal de Minas Gerais
Belo Horizonte, Brasil
eduardohbc@ufmg.br

Abstract—
Index Terms—

I. INTRODUCTION

II. METHODOLOGY

III. RESULTS

TABLE I
DATASET METADATA

Dataset	Samples	Features
Ionosphere	351	34
Binary Digits	360	64
Haberman	306	3
Pima Diabetes	768	8
Banknote	1372	4
Sonar	208	60
Breast Cancer	569	30
SPECT Heart	349	44

TABLE II
MODEL ACCURACY COMPARISON

Dataset	Accuracy			
	nn	1nn	3nn	5nn
Ionosphere	0.87	0.85	0.87	0.87
Binary Digits	1.00	0.52	0.52	0.52
Haberman	0.71	0.68	0.69	0.69
Pima Diabetes	0.73	0.52	0.52	0.52
Banknote	1.00	0.99	0.99	0.99
Sonar	0.77	0.85	0.83	0.81
Breast Cancer	0.93	0.39	0.39	0.39
SPECT Heart	0.70	0.95	0.95	0.95

TABLE III
TRAINING AND PREDICTION TIMES

Dataset	Training (ms)		Prediction (ms)			
	nn	knn	nn	1nn	3nn	5nn
Ionosphere	80.10	29.00	2.70	3.50	3.70	3.60
Binary Digits	246.70	95.10	3.00	3.10	3.20	3.20
Haberman	16.90	9.10	2.00	2.60	2.50	2.70
Pima Diabetes	76.90	30.70	2.10	5.00	4.70	4.90
Banknote	299.70	58.20	3.40	3.80	3.90	3.70
Sonar	179.40	74.30	7.40	8.10	7.00	8.00
Breast Cancer	96.10	19.60	3.10	4.00	3.80	3.50
SPECT Heart	195.40	74.40	2.20	3.00	3.00	3.00

TABLE IV
SUPPORT SAMPLES COUNT

Dataset	nn	knn
Ionosphere	101	252
Binary Digits	131	267
Haberman	54	223
Pima Diabetes	113	594
Banknote	159	179
Sonar	143	186
Breast Cancer	8	122
SPECT Heart	98	275

IV. DISCUSSION

ACKNOWLEDGMENT

REFERENCES

- [1] L. C. B. Torres, "Classificador por arestas de suporte (CLAS): métodos de aprendizado baseados em Grafos de Gabriel," Manuscript, 2016.
- [2] A. C. Souza, C. Leite Castro, J. A. Garcia, L. C. B. Torres, L. J. Acevedo Jaimes and B. R. A. Jaimes, "Improving the Efficiency of Gabriel Graph-based Classifiers for Hardware-optimized Implementations," 2019 XXII Symposium on Image, Signal Processing and Artificial Vision (STSIVA), Bucaramanga, Colombia, 2019.
- [3] J. Arias-Garcia et al., "Enhancing Performance of Gabriel Graph-Based Classifiers by a Hardware Co-Processor for Embedded System Applications," in IEEE Transactions on Industrial Informatics, vol. 17, no. 2, Feb. 2021.
- [4] J. Arias-Garcia et al., "Improved Design for Hardware Implementation of Graph-Based Large Margin Classifiers for Embedded Edge Computing," in IEEE Transactions on Neural Networks and Learning Systems, vol. 35, no. 1, Jan. 2024.
- [5] L. C. B. Torres, C. L. Castro and A. P. Braga, "A parameterless mixture model for large margin classification," 2015 International Joint Conference on Neural Networks (IJCNN), Killarney, Ireland, 2015.
- [6] L. C. B. Torres, C. L. Castro, F. Coelho and A. P. Braga, "Large Margin Gaussian Mixture Classifier With a Gabriel Graph Geometric Representation of Data Set Structure," in IEEE Transactions on Neural Networks and Learning Systems, vol. 32, no. 3, March 2021.
- [7] L. C. B. Torres, C. L. Castro, F. Coelho, F. Sill Torres and A. P. Braga, "Distance-based large margin classifier suitable for integrated circuit implementation," Manuscript, 2015.