SVM-Boosting based on Markov resampling: Theory and algorithm[1]

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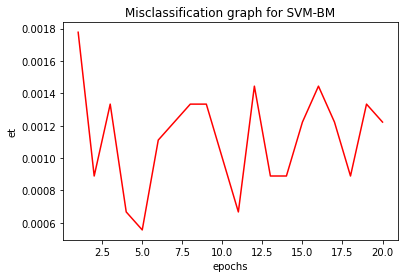
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***Abstract: Support vector machines (SVM) have been widely used for practical classification tasks . Training complexity of SVM depends on the number of training samples and therefore it increases with large datasets. This paper focuses on the approach in [1], where classification with SVM has been improved based on Markov samplingThe results show that the provided classification approach is better than the SVMC in misclassification rates, training computational time. We implement the idea of Markov resampling for Boosting methods based on Markov resampling to Support Vector Machine (SVM), by implementing Boosting algorithms: SVM-Boosting based on Markov resampling (SVM-BM) The numerical studies based on benchmark dataset show that the proposed two resampling-based SVM Boosting algorithms for linear base classifiers have small misclassification rates.***

1. **INTRODUCTION**

Pattern recognition applications is a wide domain for SVM based classification algorithms. SVM works well with samples which follow independent and identical distribution but this is not the case with applications which follow a time dependent pattern such as market prediction, speech recognition, which are dependent in nature. In recent papers, the authors studied the generalization ability of SVMC with uniformly ergodic Markov chain (u.e.M.c.) samples while optimizing the learning rate of Gaussian kernels SVM. This model of SVMC with Markov sampling still has longer total time than the general SVM classifier model. To reduce this time, an SVMC algorithm which is based on Markov sampling is used. We implement the SVM-Boosting algorithm based on Markov resampling (SVM-BM).

1. **ALGORITHM DESCRIPTION**
2. Input: Dtrain, n2, q, N, T
3. Output: sign(fT ) = sign(ΣTt=1 αt gt )
4. Draw randomly samples D0 = {zi}Ni=1 from Dtrain, train D0 by algorithm (8) and obtain a classification function g0, draw randomly a sample z from Dtrain,
5. z1 ← z, let t ← 1
6. while t ≤ T do
7. i ← 1, n1 ← 0
8. while i ≤ N do
9. Draw randomly a sample z∗ from Dtrain,
10. pi+1t ← min{1, e−ℓ(gt−1,z∗)/e−ℓ(gt−1,zi )}
11. if n1 > n2 then
12. pi+1t ← min{1, qpi+1t }, zi ← z∗, Dt ← zi, i ← i + 1, n1 ← 0
13. end
14. if pi+1
15. t ≡ 1 and y∗yi = 1 then
16. pi+1t ← e−y∗gt−1 /e−yigt−1
17. end
18. if rand(1) < pi+1t then
19. zi ← z∗, Dt ← zi, i ← i + 1, n1 ← 0
20. end
21. if z∗ is not accepted then
22. n1 ← n1 + 1
23. end
24. end
25. Obtain Markov chain Dt = {zi}N
26. i=1, train Dt by algorithm (8) and obtain another classification function gt .
27. et ← P(Y ̸= sign(gt (X))|Dtrain)
28. αt ← (1/2) ∗ log((1 − et )/et)
29. z1 ← z∗, t ← t + 1
30. if αt < 0 then
31. t ← t − 1
32. end
33. end
34. **RESULTS AND OBSERVATIONS**

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1. **CONCLUSION**

We observe that this algorithm reduces the misclassification rates.

1. **REFERENCES**

**[1]** Jiang, Hongwei et al. “SVM-Boosting based on Markov resampling: Theory and algorithm.” Neural networks : the official journal of the International Neural Network Society vol. 131 (2020): 276-290. doi:10.1016/j.neunet.2020.07.036