

THE BUCKET BOX INTERSECTION (BBI) ALGORITHM FOR  
FAST APPROXIMATIVE EVALUATION OF DIAGONAL MIXTURE GAUSSIANS

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**ABSTRACT**

state-of-the-art speech recogniz-  
ing

The projection interval  $[a_j, b_j]$  of a Gaussian box to coordinate  $j$  is given by

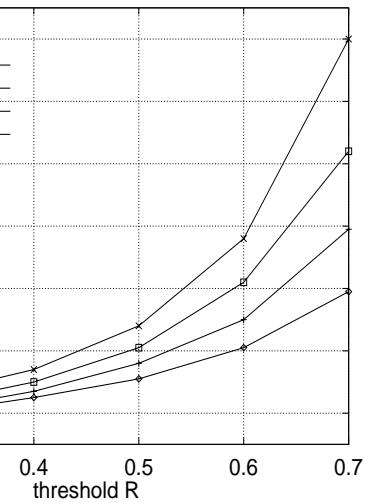
$$[a_j, b_j] = \mu_j \pm \sqrt{-2\sigma_j^2 \left[ T + \frac{1}{2} \log(2\pi) \prod_{j=1}^K \sigma_j^2 \right]}$$

Must not be chosen greater than the minimal value  
the argument of the square

andsort them along the axis. Hypothesize a division  
hyperplane  $x_i = h$  that has an equal number of left  
right sided R labels. Finding  
binary tree,

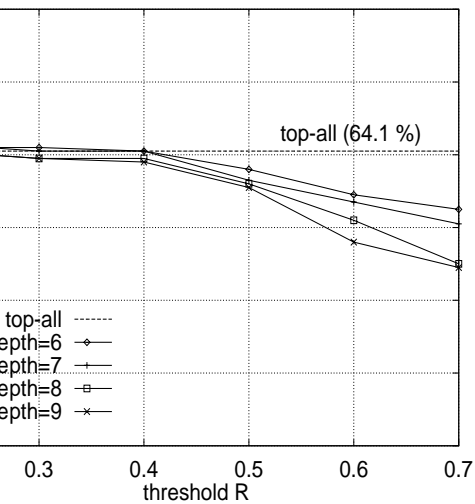
sians in the mixture by the average time required for the  
 tion of the Gaussians in the leaves of the search tree.

osed algorithm compared to top-all



peedup of proposed algorithm

tion Accuracy of BBI algorithm compared to top-all



Word Accuracy on German Spontaneous Scheduling Task

Fig 6. shows the word accuracy for several test runs with different relative thresholds  $R$  and different tree depths. The dotted line shows the accuracy of the top-all system that is evaluating all the Gaussians in the mixture. Up to a threshold of  $R=0.5$ , the word accuracy is barely affected by the use of the proposed algorithm, sometimes being even better than the top-all system.

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Today, most of the state-of-the-art speech recognizers are based on Hidden Markov modeling. Using semi-continuous or continuous density Hidden Markov Models, the computation of emission probabilities requires the evaluation of multiple Gaussian probability density functions, which is expensive to evaluate.