

# A Study on Chess Game Characterization using Meta Classifier

R.Yaswanth Babu

Dept of Computer Science, Sri Venkateswara University, Tirupati

**Abstract**— Grouping is a managed methodology that figures out how to arrange new cases in light of the information gained from a formerly characterized preparing set of occurrences. It is utilized to order every thing in a bunch of information into one of predefined set of classes or gatherings. In this examination paper the principal point is to anticipate the result of the chess games for example Ruler Rook versus Ruler and King-Rook versus Ruler paw final plans. Our objective is the foresee the result of the game regardless of whether the white lord will win. There are different Meta characterization calculations like Bagging, Adaboost and Dagging, etc. These are notable re-testing outfit techniques that create and consolidate a variety of classifiers involving similar learning calculation for the base-classifiers. We played out an examination with basic Bagging, Adaboost and dagging troupes for chess game dataset and the Bagging method would be wise to exactness (99%) by and large.

## I. INTRODUCTION

Rook and pawn final stages are the most well-known kind of final stages there is in the round of chess. These final plans occur in about in 80% of the relative multitude of games. The fundamental thought is checkmate of dark lord with white ruler and white rook. This ought to be done in under 16 stages. Chess final plans are complicated spaces which are enumerable. The game hypothetical qualities put away indicate whether positions are won for one or the other side, or incorporate likewise profundity of wins (number of moves). There will be principally two kinds of results in this game. The results are whether the white lord can dominate the match or can't dominate the match. Assuming the white lord dominates the match we can likewise anticipate that in the number of moves the white ruler that will dominate the match. In this paper we have applied characterization calculations that are associated with AI, for better arrangement, we chose the meta order for anticipating result of the chess game for example lord rook as opposed to ruler and ruler rook versus lord pawn. When we give the board places of the white lord, white rook, dark ruler, dark rook we will actually want to foresee regardless of whether the white ruler will dominate the match.

## II. DATA MINING

With the fast improvement of data improvement and affiliation headway, various exchanges produce a lot of information dependably. The genuine information can't pass direct advantages so need on to appropriately mine concealed data from giant extent of information. Information tunneling regulates looking for fascinating models or information from huge information. It's everything except a tremendous assortment of information into information. Information mining is a fundamental improvement during the time spent information divulgence [1][2]. The information mining has turned into an entrancing contraption concerning breaking down information according to substitute viewpoint and changing over it into significant and basic data [3].

Information mining has been all around applied in the space of clinical finding, Intrusion ID framework, Education, Banking, Fraud divulgence. Gathering is a coordinated learning. Figure and strategy in information mining are two kinds of information assessment task that is utilized to disconnect models depicting information classes or to expect future information plans. Depiction measure has two stages; the first is the learning affiliation where the arranging informative records are broke down by social affair assessment [6]. The learned model or classifier is introduced as strategy rules or models. The subsequent stage is the use of model for get-together, and test informational combinations are utilized to assess the accuracy of depiction rules. With the moving of information mining, choice tree expects a basic part during the time spent information mining and information assessment. Building unequivocal and accommodating classifiers for gigantic data bases is one of the fundamental tasks of data mining and AI research. Building useful requesting systems is one of the central tasks of data mining.

## III. META CLASSIFICATION

This Meta classifier makes various disjoint, defined folds out of the information and feeds each piece of information to a duplicate of the provided base classifier. Expectations are made through greater part vote, since every one of the created base

classifiers are placed into the Vote meta classifier. Helpful for base classifiers that are quadratic or more regrettable in time conduct, in regards to number of occasions in the preparation information [4].

A solitary classifier will be unable to precisely anticipate the class of an article, however when we bunch numerous frail classifiers with every one dynamically gaining from the others' wrongly arranged objects, we can assemble one such solid model.

### 3.1 Bagging

Bootstrap Aggregating or Bagging produces various bootstrap preparing sets from the first preparation set utilizing inspecting with substitution and uses every one of them to create a classifier for incorporation in the outfit [2]. Given a set,  $D$ , of tuples, stowing fills in as follows. For cycle  $I$  ( $I = 1, 2, \dots, k$ ), a preparation set,  $D_i$ , of  $d$  tuples is examined with substitution from the first arrangement of tuples,  $D$ . Note that the term stowing represents bootstrap conglomeration. Each preparing set is a bootstrap test. Since testing with substitution is utilized, a portion of the first tuples of  $D$  may not be remembered for  $D_i$ , while others might happen at least a time or two. A classifier model,  $M_i$ , is learned for each preparing set,  $D_i$ . To group an obscure tuple,  $X$ , every classifier,  $M_i$ , returns its class expectation, which considers one vote. The stowing can be applied to the forecast of ceaseless qualities by taking the normal worth of every expectation for a give test tuple. The sacked classifier frequently has essentially more noteworthy precision than a solitary classifier got from  $D$ , the first preparation information. It won't be significantly more regrettable and is more powerful with the impacts of loud information. The expanded exactness happens in light of the fact that the composite model lessens the fluctuation of the singular classifiers. For forecast, it was hypothetically demonstrated that a packed away indicator will continuously have further developed exactness over a solitary indicator got from [5].

### 3.2 Dagging

The Dagging (Disjoint examples collecting) is a variation of Bagging that makes a couple of disjoint gatherings with defined information (Davison and Sardy, 2006; Ting and Witten, 1997), each thought to be as a learning subset. The Dagging makes various disjoint, delineated folds out of the information and feeds each lump of information to a duplicate of the provided base classifier. Forecasts are made utilizing the normal of class participation probabilities in the event that the base assessor yields probabilities in any case by means of majority vote. The expectations are gotten from a greater part vote in favor of regulated characterization issues [7]. This technique has shown its significance in late works. On account of gaining from defined examples, the trait of this sort of test is that it permits the gaining calculation to create classifiers from agent tests having a similar structure as the underlying preparation set.

### 3.3 Adaboost

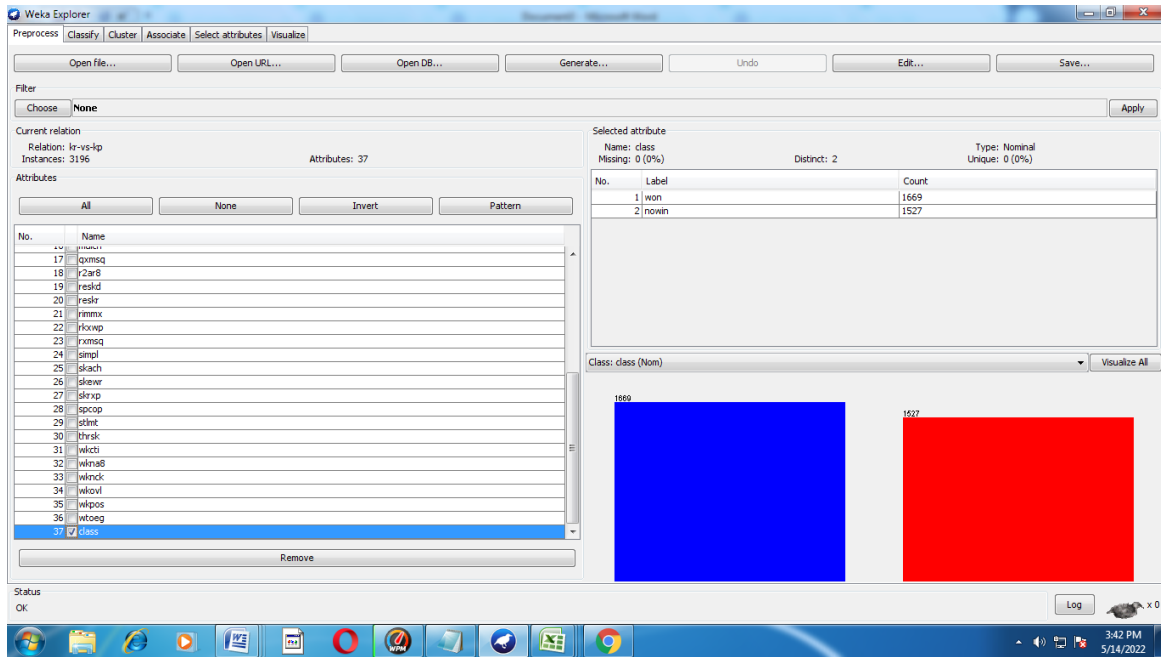
AdaBoost was the first truly effective helping calculation produced with the end goal of paired arrangement. AdaBoost calculation, short for Adaptive Boosting, is a Boosting strategy utilized as an Ensemble Method in Machine Learning. It is called Adaptive Boosting as the loads are re-alloted to each example, with higher loads relegated to inaccurately characterized occurrences [2][3]. Helping is utilized to decrease inclination as well as change for administered learning. It deals with the guideline of students developing successively. It very well may be utilized related to numerous different kinds of learning calculations to further develop execution. With the exception of the first, each ensuing student is developed from recently developed students. In basic words, feeble students are changed over major areas of strength for into. The AdaBoost calculation chips away at a similar guideline as helping with a slight distinction.

The example information isolated into a preparation set and test set, and a lot of classifiers. Every one of them is prepared on an arbitrary subset of the preparation set. Then, at that point, for every perception in every subset, AdaBoost appoints a weight, which decides the likelihood that this perception will show up in the preparation set. Perceptions with higher loads are bound to be remembered for the preparation set. Henceforth, AdaBoost will in general dole out higher loads to those perceptions which have been misclassified, so they will address a bigger piece of the following classifiers preparing set, with the point that, this time, the following classifier prepared will perform better on them.

## IV. EXPERIMENTAL RESULTS

This part gives results and related conversation on information driven analysis of Chess (King-Rook vs. King-Pawn) dataset was gathered from UCI repository [8]. WEKA is a cutting-edge office for creating AI (ML) methods and their application to true information mining issues. The information record typically utilized by WEKA is in ARFF document design. ARFF represents Attribute Relation File Format, which comprises of extraordinary labels to demonstrate separating in the

information document. WEKA implements algorithms for data pre-processing, classification. The dataset contains 3196 instances, 36 attributes and two classes like White-can-win ("won") and White-cannot-win ("nowin"). There are two distinct classes namely White-can-win ("won") contains 1669 and White-cannot-win ("nowin") contains 1527 instances. The analyses were performed considering 70% of the complete examples were preparing information and 30% were trying information.

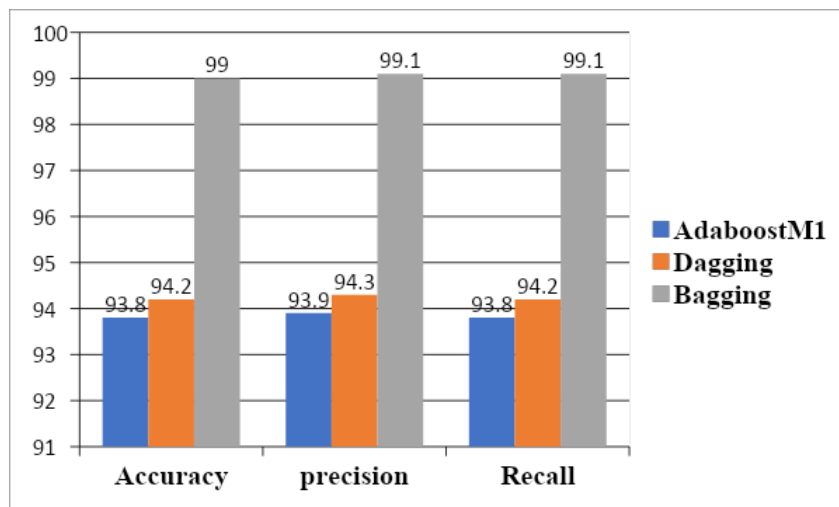


**FIGURE 1: Summary of the dataset**

We have applied the analysis on the test information utilizing three meta classifier models. We assess our three models utilizing diverse execution measurements like exactness, accuracy, and recall, the Experimental outcomes are appeared in the table-1 and same appeared in the figure-2

**TABLE 1  
EXPERIMENTAL RESULTS OF META CLASSIFIER**

Algorithm	Accuracy	Precision	Recall
AdaboostM1	93.8	93.9	93.8
Dagging	94.2	94.3	94.2
Bagging	99	99.1	99.1



**FIGURE 2: Meta Classifier Performance**

From the figure-2, we notice the exhibition of ensemble classification for Bagging 99% of Accuracy, the Adaboost ensemble has achieved the accuracy of 93.8% and Dagging ensemble has got 94.2% accuracy. So, the Bagging Ensemble classification has got highest accuracy when compared to Adaboost and Dagging. The screen shots of experimental results are shown in the figure-4 and figure-5.

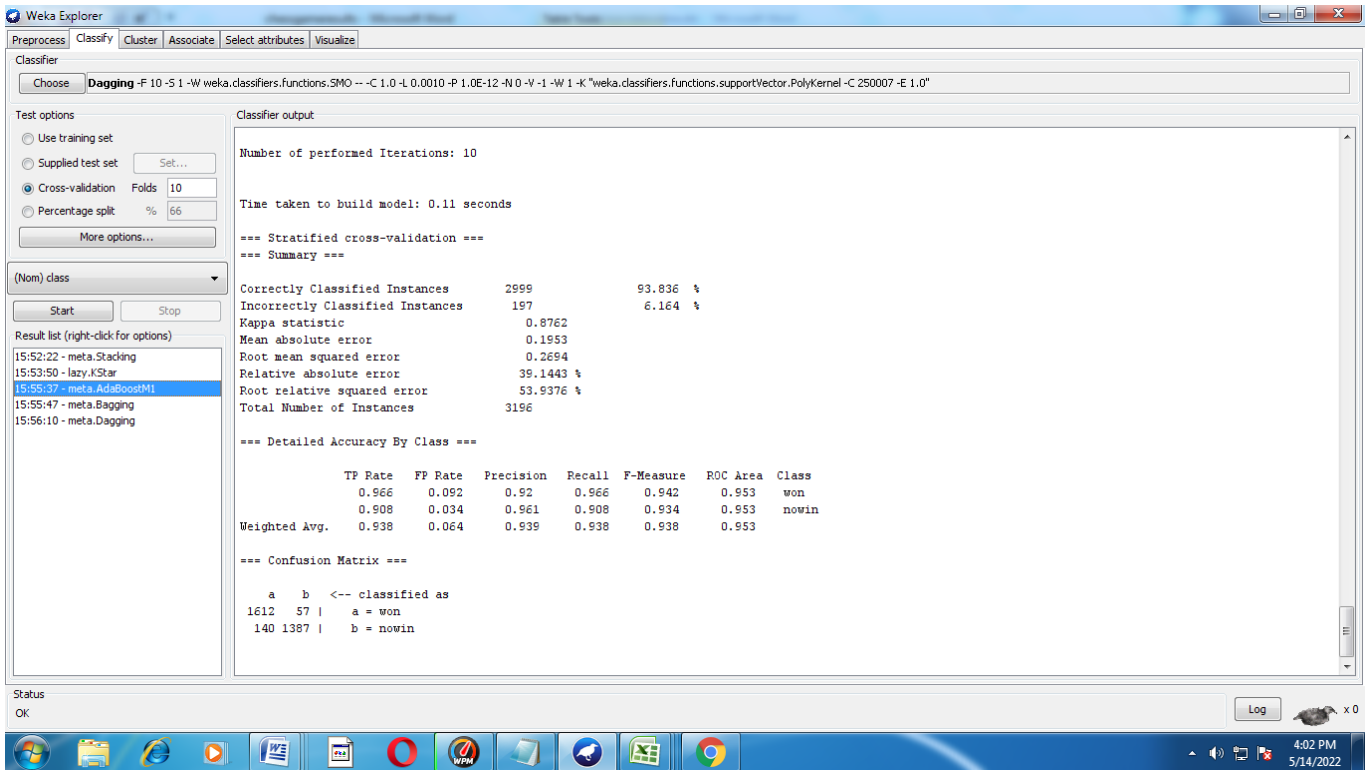


FIGURE 3: Screen shot of experimental results

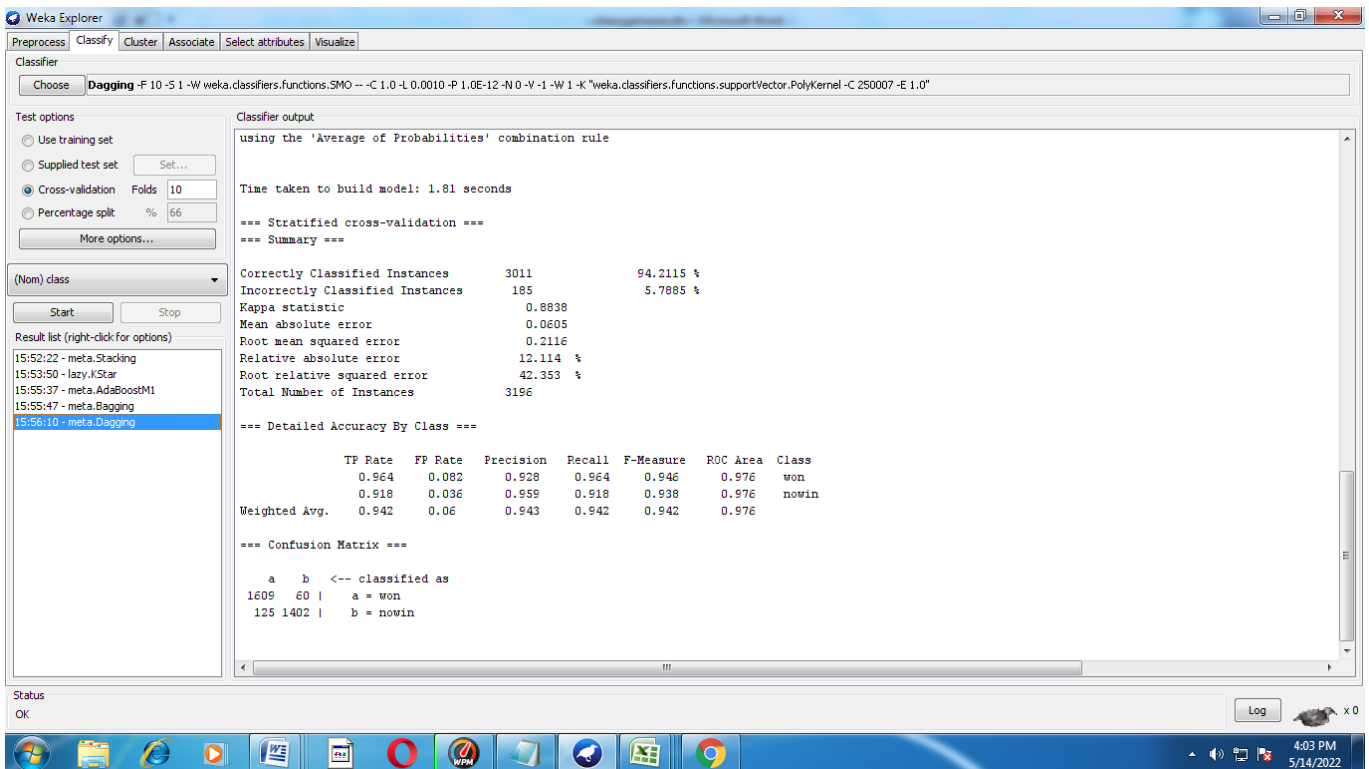
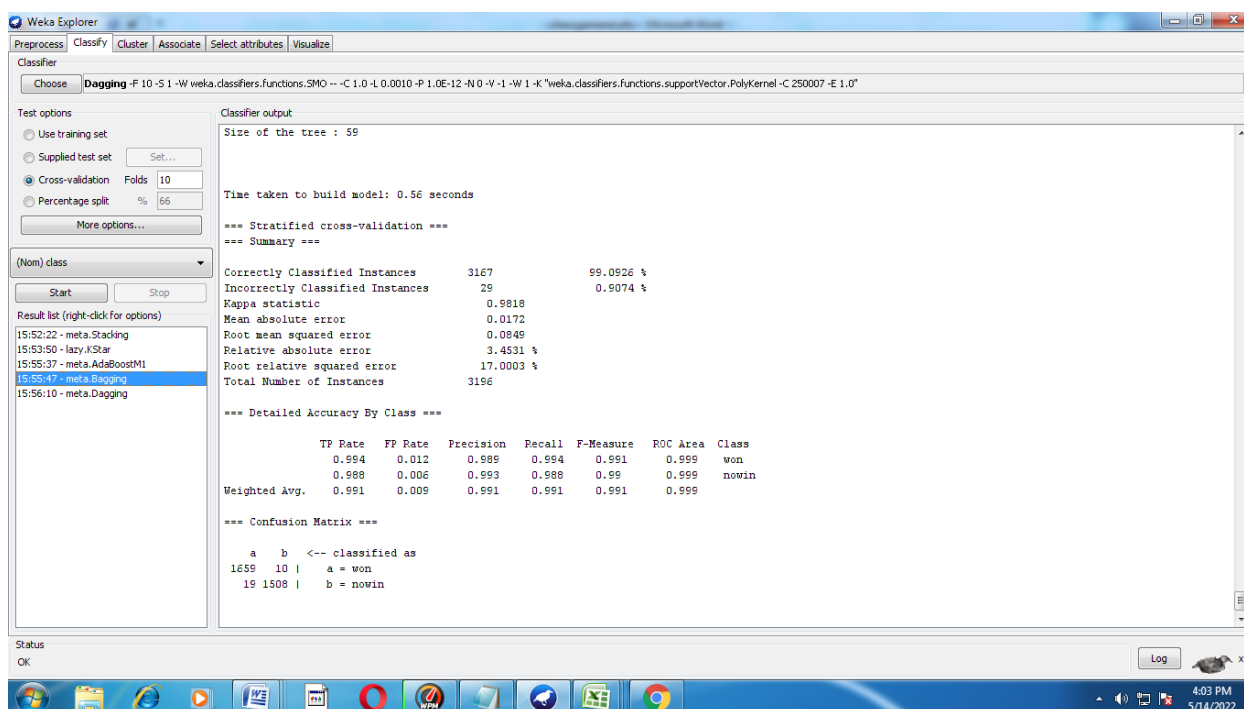


FIGURE 4: Screen shot of experimental results



**FIGURE 5: Screen shot of experimental results**

## V. CONCLUSION

Classification is a supervised procedure that learns to classify new instances based on the knowledge learnt from a previously classified training set of instances. In this research we have performed the experiments on the chess game dataset in order to determine the classification accuracy and error rate of three meta-algorithms namely Adaboost, Bagging and Dagging. From the experimental results, it can be concluded that the Bagging algorithm performs better than other two meta-algorithms in terms of accuracy measure.

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