

Activity Based Students' Performance Measure Using RGUKT Moodle Logs

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Introduction

- Blended learning, a thoughtful integration of face-to-face and online learning.
- It aims at: improving students' learning outcome and providing personalized learning experience through eLearning technologies, such as Moodle.
- Studies show that blended learning model helps students who are struggling to catch up.
- To ascertain the benefits of blended learning, a study is performed on 150 students of the blended course offered at **RGUKT Nuzvid** through the Moodle platform.

Introduction (Cont...)

- The activity Log files are analyzed on completion of the course.
- The log files include many attributes like **time span, user name, and event name** etc.
- A set of new metrics were derived from the log files as mentioned below.
- **Mean Time Between Access (MTBA)**
- **Total Time Between Access(TTBA)**
- **Sum of Activity Rating (SAR)**
- **Total Logged-in Time(TLT)**
- Finally these metrics are mapped to **Final Grade** of the students

Course Activity Logs data sample

- The sample data of the activity logs is collected from RGUKT Nuzvid, subject: Data Mining, Jan-Apr 2018.

Time	User full name	Affected user	Event context	Component	Event name	Description	Origin	IP address
1/02/18, 00:04	SHAIK MOHAMMED TASLEEMA Nuzvid	-	Assignment: Assignment-1 (15 jan-1 Feb 2018)	Assignment	The status of the submission has been viewed.	The user with id '294' has viewed the submission status page for the assignment with course module id '1605'.	web	192.168.155.102
1/02/18, 00:15	KADAMANCHI RAVI KUMAR Nuzvid	KADAMANCHI RAVI KUMAR Nuzvid	Assignment: Assignment-1 (15 jan-1 Feb 2018)	Assignment	Submission form viewed.	The user with id '250' viewed their submission for the assignment with course module id '1605'.	web	192.168.58.249
1/02/18, 00:16	KADAMANCHI RAVI KUMAR Nuzvid	KADAMANCHI RAVI KUMAR Nuzvid	Assignment: Assignment-1 (15 jan-1 Feb 2018)	Assignment	Submission form viewed.	The user with id '250' viewed their submission for the assignment with course module id '1605'.	web	192.168.58.249
1/02/18, 00:16	KADAMANCHI RAVI KUMAR Nuzvid	-	Assignment: Assignment-1 (15 jan-1 Feb 2018)	Assignment	The status of the submission has been viewed.	The user with id '250' has viewed the submission status page for the assignment with course module id '1605'.	web	192.168.58.249

Performance Measure Approach

- **Step-1:** The log file Table is sorted w.r.t. user name.
- **Step-2:** The “time” attribute is converted into second and difference between consecutive entry is taken.
- And **Mean Time Between Access (MTBA), Total Time Between Access(TTBA), and Total Logged-in Time(TLT)** are created

Performance Measure Approach(Cont...)

Step-3: The event Name is ranked and given a weight, as follows

And the attribute **Sum of Activity Rating (SAR)** is created

Event name	Rating	Event name	Rating	Event name	Rating
Course viewed	1	Submission created.	2	A submission submitted.	3
Survey response submitted	1	An online text uploaded.	2	Discussion created	3
Course module viewed	1	A file uploaded.	2	Some content posted.	3
User profile viewed	1	Quiz attempt started	2	Quiz attempt submitted	3
Discussion viewed	1	User graded	2		
The status of the submission viewed.	1	A submission submitted.	2		
Grade user report viewed	1	Course activity completion updated	2		
User list viewed	1	Post created	2		
Submission form viewed.	1	Discussion subscription created	2		
Quiz attempt viewed	1	Some content posted.	2		

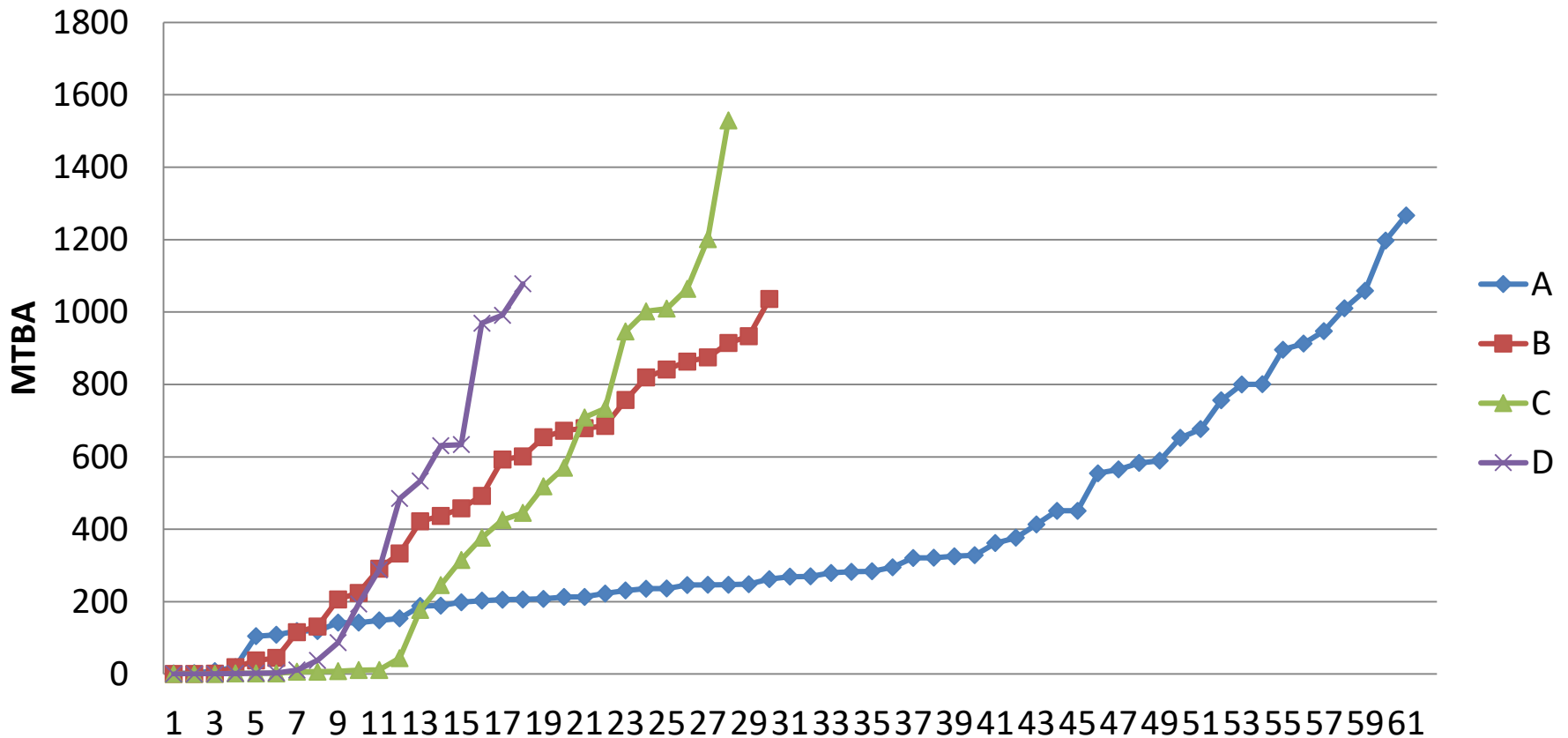
Performance Measure Approach (Cont..)

- **Step-4:** Finally the sample data Shown below, is obtained

MTBA	TTBA	SAR	TLT	Grade
11.14	78	7	3	C
11.54	300	26	13	C
18.95	379	27	10	B
19.25	462	34	14	A
37.38	299	8	5	B
37.84	1400	6	1	D
44.00	88	2	3	C
44.40	666	21	7	B
86.57	606	7	2	D
104.49	4493	43	16	A

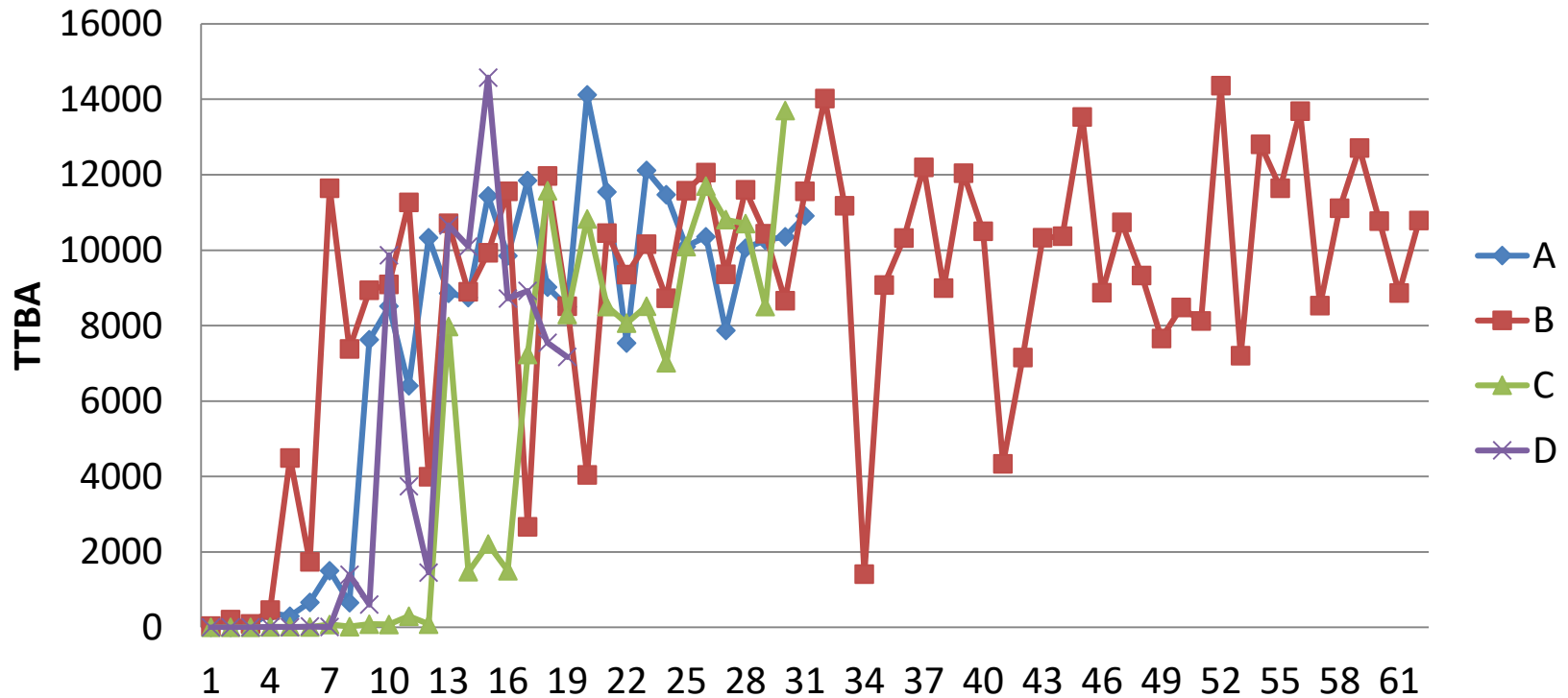
Distribution of the Attributes w.r.to the Grade (the Target variable)

Distribution of Mean Time between Access vs Grade of the students



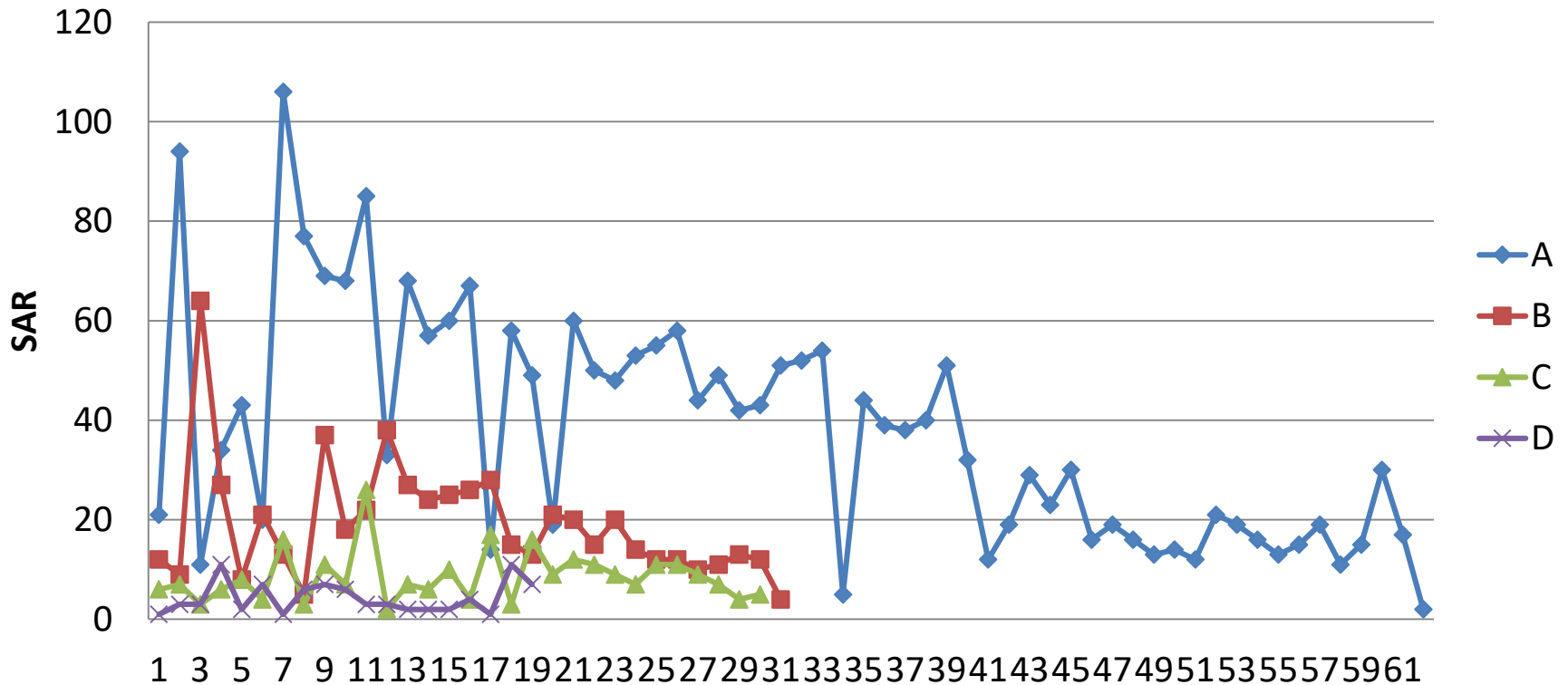
Distribution of the Attributes w.r.to the Grade (the Target variable) (Cont..)

Distribution of Total Time Between Access vs Grade of the students



Distribution of the Attributes w.r.to the Grade (the Target variable) (Cont..)

Distribution of Sum of Activity Rating vs Grade of the students

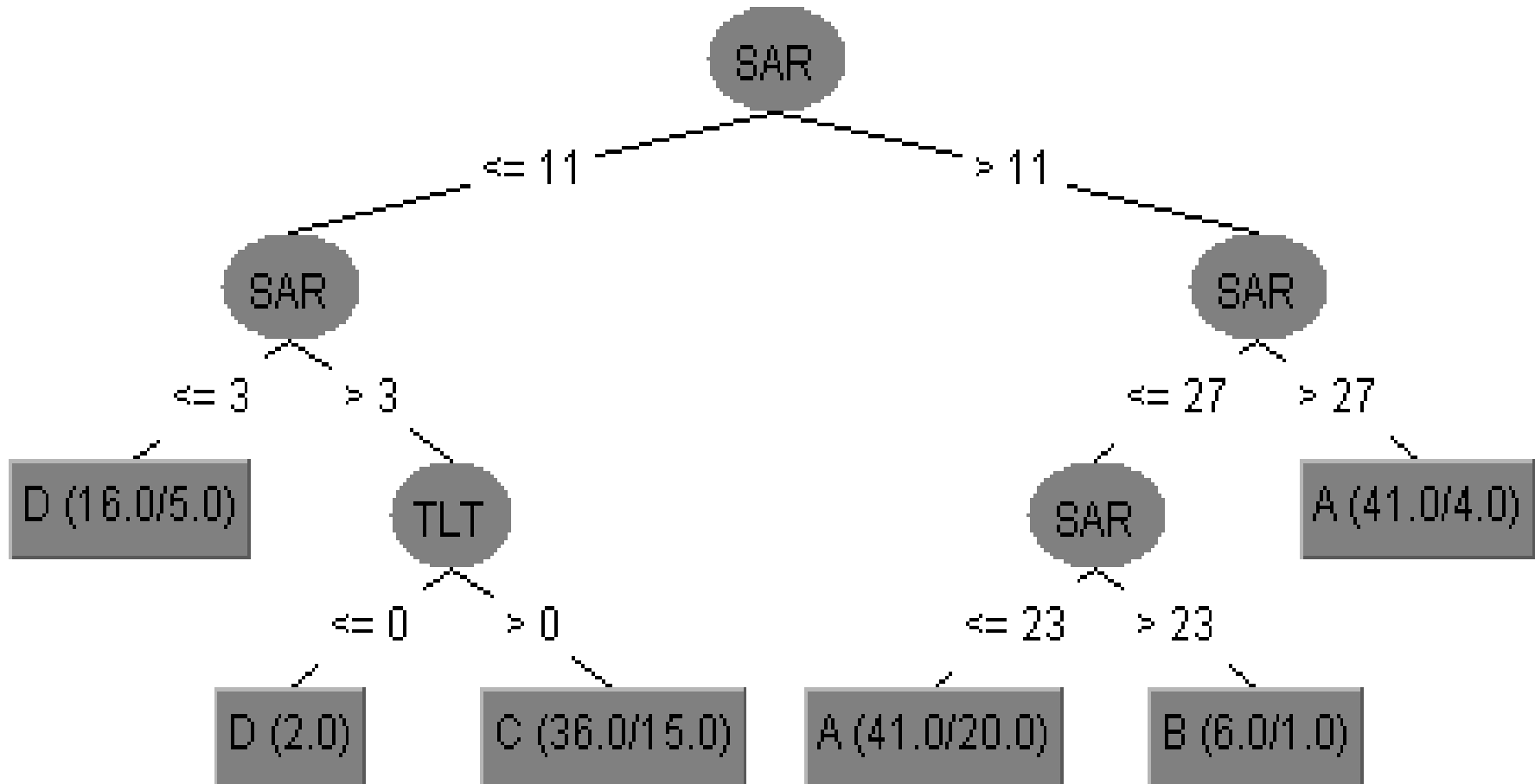


Performance Measure Approach (Cont..)

- **Step-5:** As the target variable (Grade is labelled), Classification technique is applied.
- As our Purpose is to obtain the Relation between the moodle activities and the final grades of the students, we applied Decision Tree Classification Method.

Performance Measure Approach (Cont..)

- The Decision Tree depicted Below. It is noticed that The **Sum of Activity rating(SAR)** and the **Total Logged-in Time(TLT)** are deciding the relation with Final Grade.



Performance Measure Approach (Cont..)

- Mean Time Between Access (MTBA), Total Time Between Access (TTBA) are not participating in the decision because they appear to be random, the reason is the course is not fully developed and that is why students could not adopt it up to the marks.
- Every Path from root node to leaf node of the Tree is a rule, as shown below

```
SAR <= 11
|   SAR <= 3: D (16.0/5.0)
|   SAR > 3
|   |   TLI <= 0: D (2.0)
|   |   TLI > 0: C (36.0/15.0)
SAR > 11
|   SAR <= 27
|   |   SAR <= 23: A (41.0/20.0)
|   |   SAR > 23: B (6.0/1.0)
|   SAR > 27: A (41.0/4.0)
```

Computational Result

- The model is constructed with K-fold cross validation approach.
- The Performance measures are Tabulated below.
- Accuracy= 61.9718 %
- TP Rate Precision Recall F-Measure ROC Area
- 0.62 0.592 0.62 0.6 0.78

=== Confusion Matrix ===

a	b	c	d	e	<-- classified as
19	5	2	4	0	a = C
7	11	1	0	0	b = D
6	0	7	17	0	c = B
2	1	8	51	0	d = A
0	0	1	0	0	e = b

Conclusion and Future Work.

- As the subject is offered first time and course is not fully developed, so the Model accuracy is “OK”; e.g. 61%, which needs improvement further.
- **Referring to the Distribution of the Attributes w.r.to the Grade, it is observed that students having higher grade have higher Sum of Activity rating(SAR) and the Total Logged-in Time(TLT) .**

Thank You