Chapter 11
Problems

Enhance your knowledge and further understanding of the concepts guided by the following questions.

Problem-1
Consider the data of 05 students in your class.

Student number	Number of practice tests attempted	Final score in the exam
1	2	3.5
2	3	4
3	9	9
4	1	3
5	5	6

Build the best regression model to fit this data.

Problem-2
Consider that you are a professor for a course. You have two teaching methods. You want to test which is the effective teaching method you want to consider for your future teaching. You teach Class-A using Teaching Method-1 and Class-B with Teaching Method-2. You conducted the same test in both classes for the same topic. Now you have the scores of the students if both the classes. Use any Learning Analytics tool and find out which teaching method is effective for that course.

Problem-3
You have the data of 100 students

- C1: number of hours the student logged-in in the online course portal
- C2: score in the final exam

S. K G, M. Kurni, *A Beginner's Guide to Learning Analytics*, Advances in Analytics for Learning and Teaching,
https://doi.org/10.1007/978-3-030-70258-8_11

Using this data and any Learning Analytics tool determine the relationship (build a model) between the number of hours the student logged in in the online course portal and the final exam score.

Problem-4
Consider the following data of 60 students in your class.

- C1: Performance in the final test
- C2: the number of hours spent on the learning environment
- C3: the number of quizzes attempted in the learning environment

Using this data and any Learning Analytics tool, find that which will be the more significant predictor, i.e., either C2 or C3, the students' performance in the final test.

Problem-5
You are given the following data from a study conducted with learners interacting with a learning environment.

- Student_ID
- Page_ID
- Activity_ID
- Time_Spent_on_Page

From the above data find

- What are the different ways in which learners navigate through activities in the learning environment
- In which activity do learners spend the maximum time

Problem-6
Consider a dataset that consists of students' data interacting with an Online MOOC Course. The features can be extracted from the log-data. Following are the details about the features-

- *SID*- Student ID.
- *Learn*- The no. of lessons completed by the learner.
- *Quiz*- The no of quizzes attempted by the learner.
- *Coins*- The no. of coin earned by the learner.
- *Responses*- The no of responses in the Discussion forum.
- *Activities*- The total no of activities completed by the learner.
- *Coins/act*-The no. of coins earned per activity.
- *Inactive_time*-The time for which the student has not performed any action.

Use the above features to predict the target variable.

Target- This informs whether the student will logout from the system before or after the given fixed time.

Develop a logistic regression model (ten-fold cross-validation) and then evaluate your model to answer the following questions. You can also use Weka for this purpose that was demonstrated in the course.

(Report all your answers correct to 2 decimal places)

- The AUC value of the model is
- The F1 value of the model is
- The Recall value of the model is
- The precision value of the model is
- The accuracy

Problem-7
Consider a dataset that consists of students' data interacting with an Online MOOC Course. The features can be extracted from the log-data. Following are the details about the features-

- *S_ID*- Student ID
- *Qualification*- This feature classifies students into three categories, Master's, Bachelor's, and Doctorates.
- *Chapters_Completed*- This represents the no. of chapters completed by a particular student.
- *No_of_post*- This informs the no. of times a student has posted in the discussion forum.
- *Marks*- The marks obtained by a particular student in the first assignment.

Use any Learning Analytics tool of your choice to visualize this data and answer the following questions.

- Find the interquartile range of "Chapters_Completed" with the help of a box-plot.
- Use the bar graph and report the percentage of the students having a Bachelor's degree enrolled in the course.
- Use a pie chart to represent the gender distribution of students enrolled in the course. What is the percentage of female students enrolled in the course?
- With the visualization chart's help, identify the percentage of males who have scored ten marks in the test.
- What is the median of marks scored by Doctoral students?

Problem-8
Consider the data of 05 students in your class.

Student number	Engagement	Scores in the mid_sem exam	Scores in the end exam
1	80	75	60
2	55	60	55
3	90	80	90
4	95	80	88
5	45	40	50
6	50	55	60
7	65	60	70
8	60	50	60

From the above data

- Consider that 'Engagement' and 'Scores in the Mid_Sem exam' are independent variables used to predict the Scores in the End exam. Find out the correlation between variables.
- If only one independent variable should be selected to predict Scores in the End exam, then what will be that variable.

Problem-9
Consider the data of 60 students in your class.

- Student_ID
- Attribute_Value_1
- Attribute_Value_2
- Attribute_Value_3

Sample Data is as follows

Student number	Score in test_1	Score in test_2	Score in test_3
1	6	6	5
2	5	2	6
3	10	3	4
4	5	3	9
5	6	5	6
6	4	2	1
7	9	4	6
8	6	7	7

From the above data find

- What percentage of students who scored two marks in Test_2 has scored 5 in Test_1
- What percentage of students scoring eight marks in Test_3
- What is the number of students that have scored five marks in both Test_1 and Test_3

Problem-10
Consider the following THREE students' interaction behavior in a MOOC course.

- S1: Read Video Quiz Read Video Forum Quiz Read Forum Quiz
- S2: Video Read Read Quiz Video Forum Read Video Forum Quiz
- S3: Quiz Video Forum Read Quiz Video Read Video Quiz Forum

By using any Learning Analytics Tool find the following

- Find the value of s-Support for the pattern "Read-Video."
- Find the value of i-frequency for the pattern "Read-Video."
- Calculate the value of s-Support for pattern: "Quiz-Video."

- Calculate the value of i-frequency for the pattern "Quiz-Video."

Problem-11
Consider that you have completed an online course and you have taken feedback from the participants about the Course Instructor as follows on a scale of 1–5 (1-Lowest and 5-Highest)

- Subject Knowledge
- Ability to Interact
- Application of updated Information
- Ability to retain the attention of participants
- Ability to answer questions
- Presentation Quality
- Communication Skill

Using the collected feedback, evaluate the performance of the Instructor as (Poor, Fair, Good & Excellent)

Problem-12
Consider that you have completed an online course and you have taken the following feedback from the participants about the Course

- Your Role (Student, Faculty, Employer, Other)
- Was the course interesting? (Yes, No)
- Did the course cover the topics given in the initial syllabus? (Yes, No)
- Rate the difficulty level of the course. (Very difficult, Difficult, Moderate, Easy, Very easy)
- Rate the clarity of the videos posted. (Not exact, Normal, Clear, Very clear)
- Rate the clarity of the audio in the video. (Not Clear, Normal, Clear, Very Clear)
- Lessons and assignments were posted on the schedule. (Yes, No)

Based on the above feedback data, evaluate whether the course fulfilled the participants' professional/personal objectives?

Problem-13
Consider that you have completed an online course and you have taken the following feedback from the participants about the assignments given during the course to the participants

- Were assignments given regularly? (Yes, No)
- Were the assignments relevant to the module taught? (Yes, No)
- Rate the difficulty of the assignments. (Very difficult, Difficult, Moderate, Easy, Very easy)
- Was sufficient time given to submit assignments? (Yes, No)
- Whether the solutions published are clear and useful? (Yes, No)

Based on data, identify the effectiveness of the assignments given during the course.

Problem-14
Consider that you have completed an online course and you have taken the following feedback from the participants about the assignments given during the course to the students

- Does your course contain a LIVE session? (Yes, No)
- Have you watched the LIVE session? (Yes, No)
- Was the LIVE session useful? (Yes, No)

Based on the above feedback, Rate the Live Session on a 1–5 scale (1-Very Poor & 5-Excellent)

Problem-15
Consider that you have completed an online course, and you have taken the following feedback from participants about the Discussion Forum ran during the course to the participants.

- Was the forum active throughout the course? (Yes, No)
- Were questions regarding the lessons/assignments posted - answered promptly and satisfactorily? (Yes, No)

Based on the above feedback, Rate the Discussion Forum 1–5 scale (1-Very Poor & 5-Excellent)

Problem-16
Consider that you have completed an online course, and you have taken the following feedback from the participants about the Material supplied during the course to the participants.

- Why would you prefer material? (It is easier to read as notes than listening to the video, Video was too long to watch, Poor internet bandwidth, Following the Professor's language was challenging, Handy for exam preparation)
- Do you watch videos along with the subtitles? (Yes, No, Maybe)
- How would you prefer to study? (View the videos alone, Study from the material alone, View the videos and learn from the material)
- Do you want the material (English) translated into your local language? (Yes, No)
- Where would you go and look for material? (Material supplied during the course, Browse Internet)

Based on the above feedback rate, the quality of the material supplied on a scale of 1–4 (1-Very Useful & 4-Poor)

Problem-17
Consider that you have completed an online course and have taken the following feedback from the participants about the course's certification exam from the participants.

- Rate the difficulty level of the exam. (Very difficult, Difficult, Moderate, Easy, Very easy)

- Rate the performance of the online exam platform. (Very poor, Poor, Moderate, Good, Very good)
- Rate the facilities and invigilation at the exam center. (Very poor, Poor, Moderate, Good, Very good)

Based on the above feedback, find the following perception of the participant.
Did the participant opt for the certification exam? (Yes, No)
If the answers to the above question are YES, find out which platform the participant would prefer in the future (Online, Offline, Traditional)

Problem-18
Consider that you have completed an online course, and you have taken the following feedback from the participants about the overall experience on the course from the participants.

- Overall, are you satisfied with the quality of this course? (Very poor, Poor, Moderate, Good, Very good)
- Online Platform/Tool/Website was easy to use. (Very difficult, Difficult, Moderate, Easy, Very easy)
- Will you continue with the future online courses? (Yes, No)

Based on the above feedback find

- which one is better? (Online Platform, Regular Classroom Classes)
- whether to continue this course in the future (Yes, No)

Problem-19
Consider that you have completed an online course, and you have taken the following feedback from the participants about the overall experience on the course from the participants.

- Overall satisfaction with the course? (Very poor, Poor, Moderate, Good, Very good)

Analyze students' responses and group them into categories such as

- good understanding
- Moderate
- Significant difficulties

Problem-20
Consider that you have completed an online course and you have taken the following feedback from the participants about the assignments given during the course to the participants

- Were assignments given regularly? (Yes, No)
- Were the assignments relevant to the module taught? (Yes, No)
- Rate the difficulty of the assignments. (Very difficult, Difficult, Moderate, Easy, Very easy)
- Was sufficient time given to submit assignments? (Yes, No)
- Whether the solutions published are clear and useful? (Yes, No)

Based on data, identify specific questions/assignments where the students faced difficulties in responding.

Problem-21
Consider that you have completed an online course. From the log files, collect the learners' clicks on VLE activities of the course and visualize the number of clicks per activity. For example:

- Home page
- URL
- Subpage
- Resource
- Glossary
- Forum, etc.

Problem-22
Consider that you have completed an online course. Based on the queries students posted in the chatbox/forum, identify a concept or principle, your students facing significant difficulty in understanding that concept.

Problem-23
A week or two before the final exam, conduct a pre-final examination for the course you thought. Based on the performance in this exam and other mid-term examinations, identify

- at-risk students and
- the pass percentage of your class

Problem-24
Choose 1–3 problems and ask your students to solve the problem. Collect

- The number of students who responded to the problem
- Number of who correctly solved the problem
- Number of students who attempted to solve the problem but failed in achieving the correct solution

Based on this data, assess the problem-solving skills of your students and cluster them into groups.

Problem-25
During an online course, pose 1–2 questions to students and record the students' response time to those questions. Based on the responses, cluster students into slow-learners and fast learners.