

Confusion Matrix: Predicted vs Actual Sleep Quality

Predicted Sleep Quality / Record Count			
Actual Sleep Quality	good	poor	Grand total
good	296	6	302
poor	31	119	150
Grand total	327	125	452

Model Performance Summary

The logistic regression model achieved an accuracy of 91.8%, with a precision of 90.5%, a recall of 98.0%, and an F1 score of 86.5%. The confusion matrix shows the distribution of actual vs. predicted sleep quality labels, indicating strong performance in detecting both classes, especially “good” sleep.

Average Feature Values by Actual and Predicted Sleep Quality

	Actual Sleep Quality ^	Predicted Sleep Quality	Record Count	Deep Sleep %	Light Sleep %	Caffeine (mg)	Alcohol Consumption	sleep_duration
1.	good	poor	6	56	20.5	8.33	3.17	7.83
2.	good	good	296	61.49	15.84	24.07	0.6	7.44
3.	poor	poor	119	28.99	48.7	20.38	2.23	7.51
4.	poor	good	31	60.97	15.94	16.13	1.65	7.45

Model Interpretation: Feature Contributions and Misclassification Patterns

Deep and light sleep percentages appear to drive most model decisions, with high-quality sleep associated with significantly more deep sleep and less light sleep. While good sleepers consumed more caffeine and considerably less alcohol on average, these effects are likely correlational rather than causal. For example, poor sleepers tend to consume more alcohol, but alcohol consumption itself may not directly affect sleep quality. This is reflected in the model incorrectly predicting poor sleep for individuals with high alcohol or low caffeine intake, even when their actual sleep quality was good. These patterns suggest the logistic regression model is well-calibrated on physiological sleep metrics, but tends to overfit on certain lifestyle variables such as caffeine and alcohol intake.