**Table 3. Ablation Study Results**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Model Variant** | **Accuracy (%)** | **F1 Score (%)** | **Specificity (%)** | **Sensitivity (%)** | **ROC-AUC (%)** | **MCC** | **Loss** |
| Proposed Model (Full) (Fuzzy Logic + Mayfly Algorithm + XAI) | 99.2 | 98.9 | 98.7 | 98.5 | 99.4 | 0.979 | 0.07 |
| Without Fuzzy Logic | 96.5 | 95.8 | 95.2 | 94.8 | 96.9 | 0.95 | 0.03 |
| Without Mayfly Algorithm | 95.2 | 94.3 | 93.8 | 93.5 | 95.5 | 0.94 | 0.04 |
| Without XAI (Standard DL) | 94.0 | 93.0 | 92.5 | 92.0 | 94.2 | 0.93 | 0.05 |