**Reliable novel hybrid MFO-based ML models for classifying the failure modes of steel plate girders under patch loading**

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**Fig. S-1.** Synthetic database.

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with low confidence

A screenshot of a computer

Description automatically generated with medium confidence

**Fig. S-2.** Accuracy performance of 10-fold.

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with low confidence

A screenshot of a computer

Description automatically generated with medium confidence

**Fig. S-3.** Recall performance of 10-fold.

A screenshot of a computer

Description automatically generated with low confidence

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with medium confidence

**Fig. S-4.** Precision performance of 10-fold.

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer

Description automatically generated with low confidence

A screenshot of a computer

Description automatically generated with medium confidence

**Fig. S-5.** F1-score performance of 10-fold.

Graphical user interface, application

Description automatically generatedGraphical user interface

Description automatically generated with low confidence

Graphical user interface, application, Teams

Description automatically generatedGraphical user interface, application, Teams

Description automatically generated

Application

Description automatically generated with medium confidenceGraphical user interface

Description automatically generated with low confidence

Application

Description automatically generatedA picture containing application

Description automatically generated

Graphical user interface, application

Description automatically generatedGraphical user interface

Description automatically generated with low confidence

Graphical user interface, application

Description automatically generatedGraphical user interface

Description automatically generated with low confidence

Graphical user interface, application

Description automatically generatedGraphical user interface

Description automatically generated with low confidence

Graphical user interface, application

Description automatically generatedGraphical user interface

Description automatically generated with low confidence

**Fig. S-6.** Performance of ML models.