HFS-SAFIN(FRIE)++

Self-Adaptive Fuzzy Inference Network++ with Fuzzy Rule Interpolation and Extrapolation and Hierarchical Feature Selection
empowered with
Reconstruction of Bank States via Longitudinal and Lateral Perspectives of Financial Records

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Motivation

Two main issues with FNN-based early warning systems:

1 Lack of online learning capability – required to retrain models to incorporate new data instances

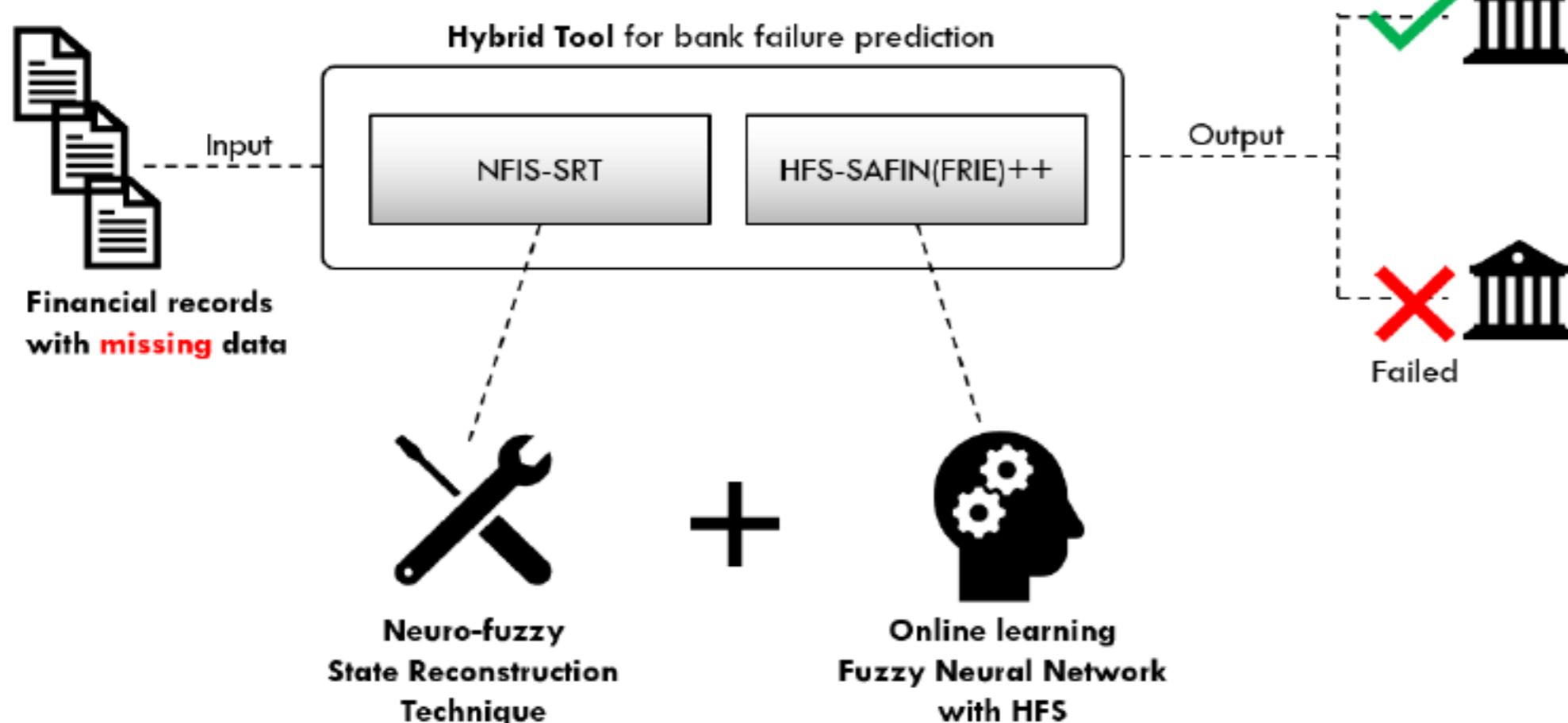2 Flaw in data pre-processing stage – discarded banks with missing data, reducing sample size to 3635 to 3103 banks

> To propose an effective hybrid tool for bank failure prediction based on Neuro-fuzzy systems
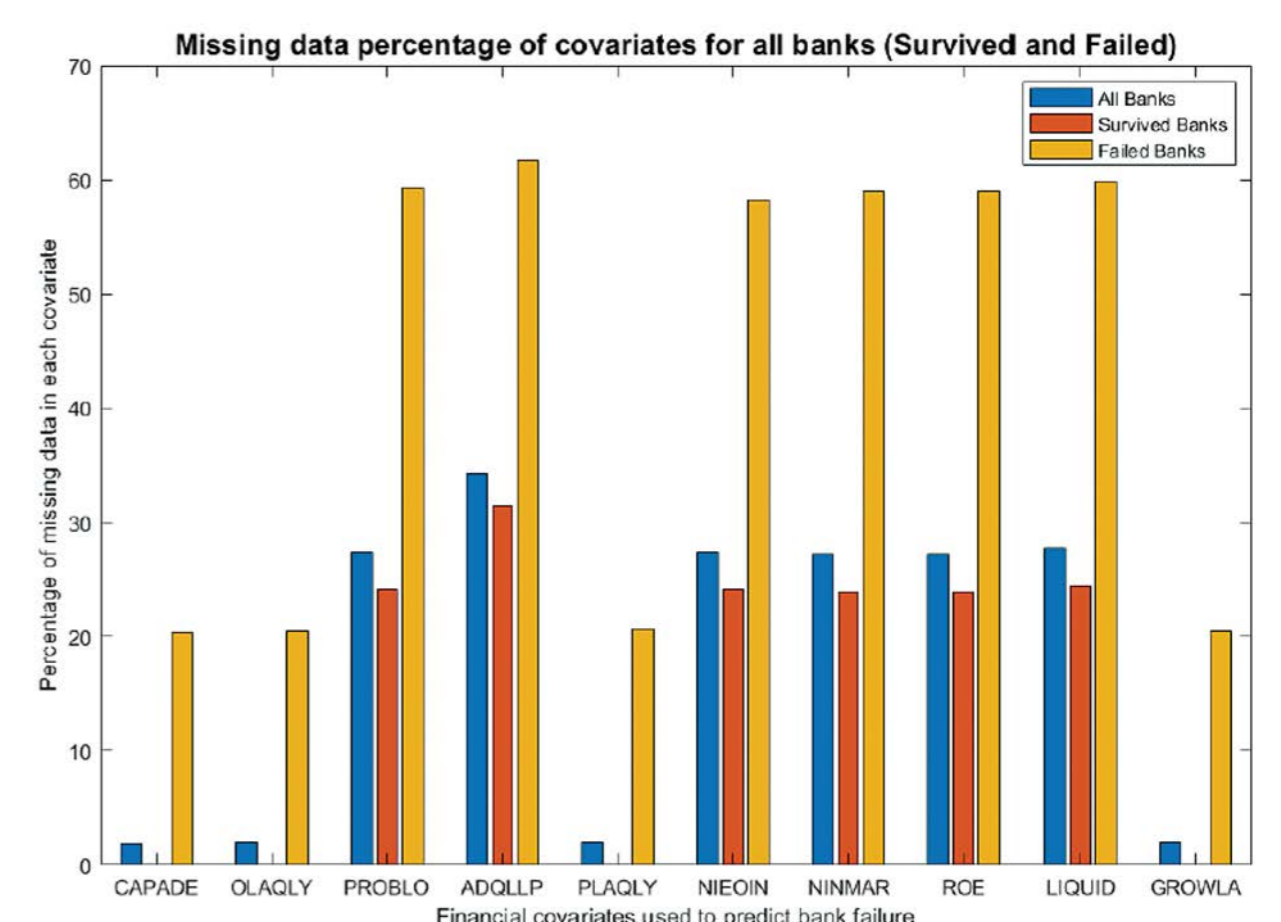
Large proportion of missing data among failing banks (orange tiles)

Design & Implementation

1 Financial Records with Missing Data

2 Financial Records with Reconstructed Data

3 Hierarchical Feature Selection

4 Online Learning with Optimal Feature Subset

5 Perform Bank Failure Prediction

Experimental Results & Analysis

	S1: Last Available			S2: One-Year Prior			S3: Two-Year Prior		
	Accuracy	Feature	Rules	Accuracy	Feature	Rules	Accuracy	Feature	Rules
Original data set	92.46	1.4	8.4	86.726	1.2	6.4	79.03	1.4	**5.2**
Reconstructed data set (simulated 20% missing data)	**93.83**	1.8	**7.4**	87.712	1.2	**6**	81.046	1.4	6.2
Fully reconstructed data set (actual missing data)	93.154	**1.2**	10	**87.954**	1.2	8.2	**84.634**	1.6	7.2

Superior prediction accuracy with reconstructed data set

More concise rule with reconstructed data set

PLAQLY	Decision
L	SURVIVED
H	FAILED

⚠ "If PLAQLY is HIGH, the bank is going to FAIL with the probability of about 88% in one-year time."