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SAVING OUR NATION'S BRIDGES

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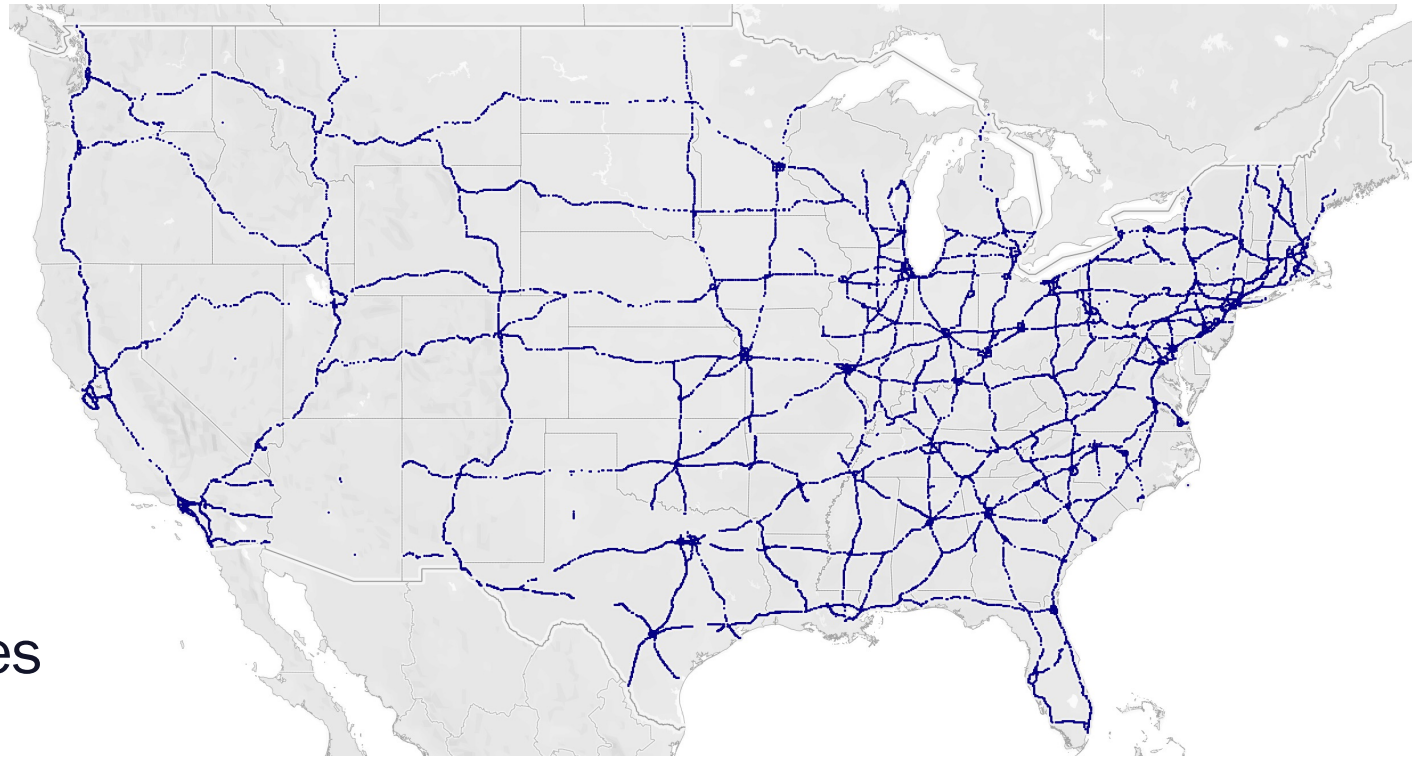
Unsolicited Report to the American Society of Civil Engineers
29 October 2021

Introduction

- The *American Road & Transportation Builders Association* reports *171.5 million daily crossings on over 45,000 structurally deficient U.S. bridges*
- Fortunately, lawmakers are earmarking $3.265B for a *5-year Bridge Reinvestment Program*
- While significant, it is likely insufficient to address current and future deficiencies

The State of the National Highway System

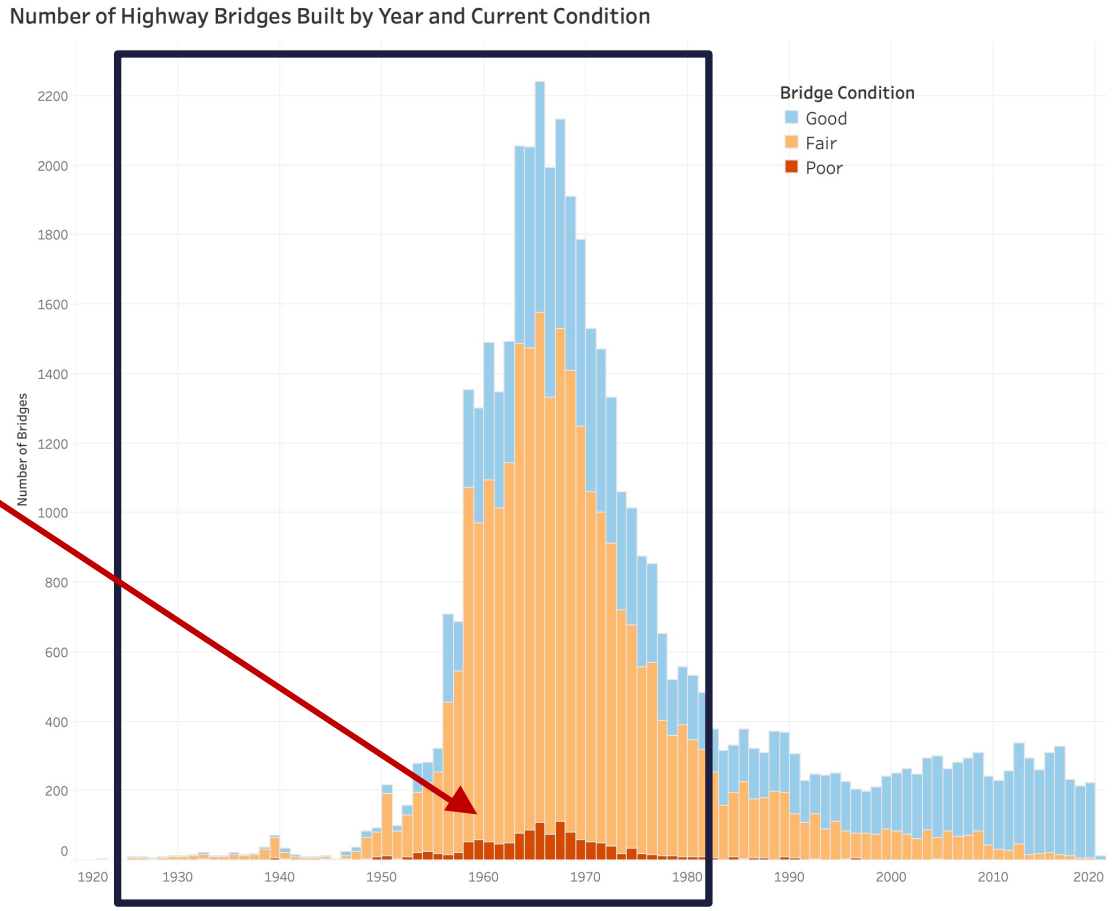
- 45,962 National Highway System Bridges in the US
- 74% are Stringer / Multi-beam, Girder, or Culvert Bridges
- Most are Concrete construction
- Typical highway overpasses



The State of the National Highway System

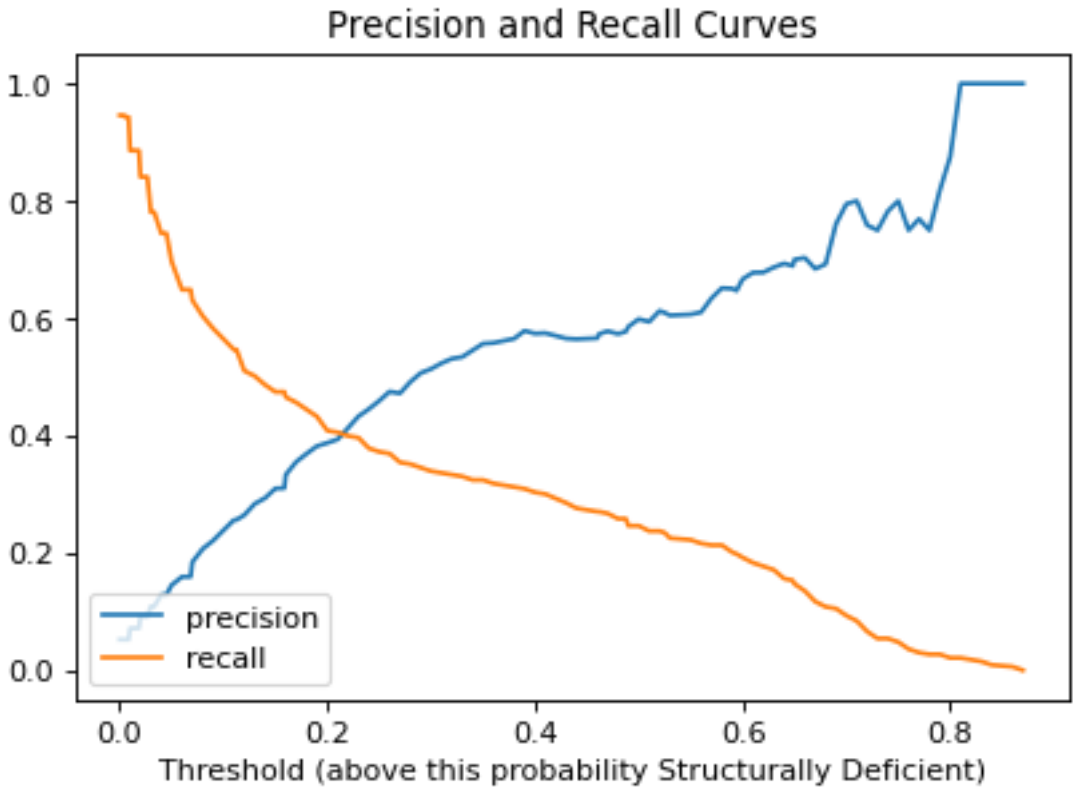
- 76% of NHS Bridges are more than 40 years old
- 3% (1,363) are classified as Poor - Structurally Deficient and will receive investment

What about the 59% classified as Fair – Needing Repair?



Modeling

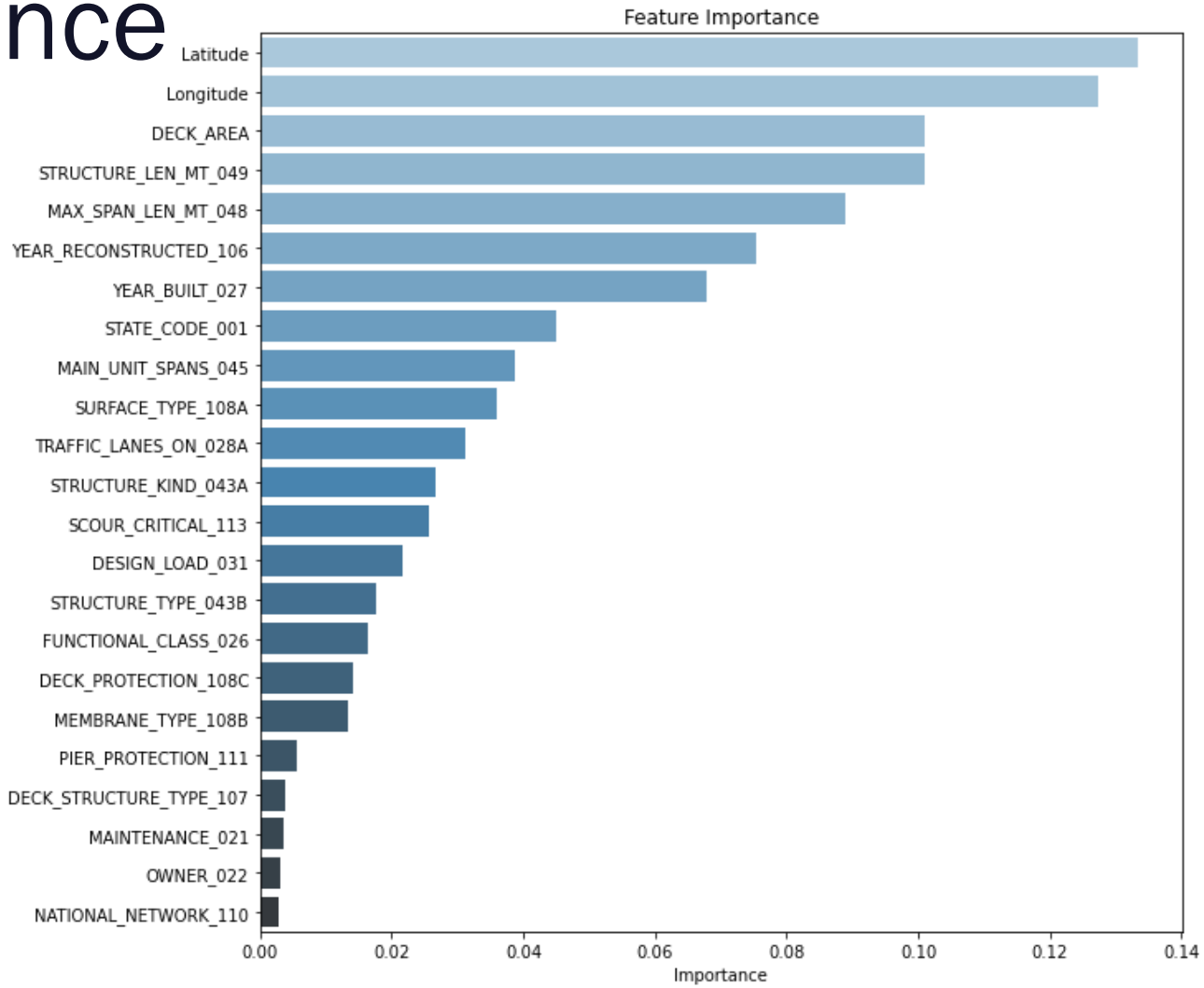
- Developed an *Ensemble Random Forest Classifier* to identify Bridge features that are Important when looking at Structural Deficiency
- Focused on high Recall to minimize False Negatives
- Model provides probability of Structural Deficiency



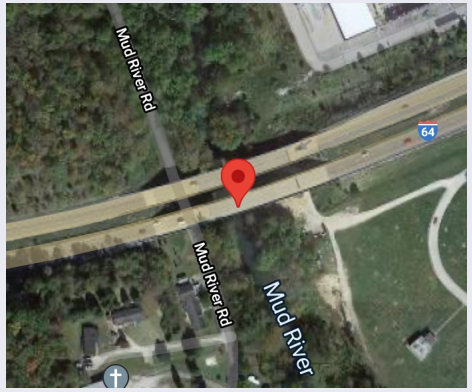
ROC AUC: 0.875
Threshold: 0.01

Feature Importance

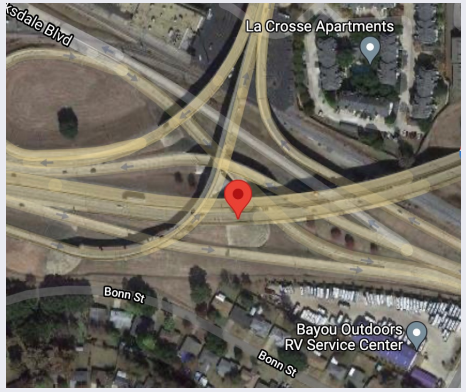
- Location
- Dimensions
- Age
- Type



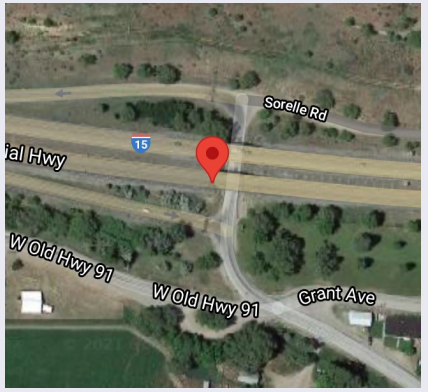
Fair Rated with High Probability Features



I-64 at Mud River
Barboursville WV
Built: 1959
Daily Traffic: 20,350
Planned Repairs: $31K in 2036



I-20 at US-71
Bossier City LA
Built: 1966
Daily Traffic: 43,950
Planned Repairs: $34K in 2036



I-15 at Inkom
Inkom ID
Built: 1962
Daily Traffic: 8,500
Planned Repairs: $13K in 2038

Photo by Wikimedia Commons / The Eloquent Peasant

PR-2 at Guayanilla River
Guayanilla PR
Built: 1970
Daily Traffic: 37,800
Planned Repairs: $48K in 2025

Recommendations

- Proceed with the repair of Poor Condition, Structurally Deficient Bridges
- Refine the Model for improved Precision
- Leverage the Model to better identify and prioritize Bridge Reinvestment Funds to address repair / replacement for Bridges in Fair Condition