USING NEURAL NETWORKS FOR STRUCTURAL LOAD CALCULATIONS AND COST OPTIMIZATION IN CONSTRUCTION PROJECTS

TRADITIONAL CALCULATION METHODS: CAD/CAE SYSTEMS

- Detailed Calculations for Each Structural Component
- Iterative Process: Partial Results Need to be Recalculated at Each Iteration
- Time-Consuming and Resource-Intensive Computations for Complex Projects

THE IDEA

- Aim to Reduce Time and Resources for Redundant Calculations
- Proposed Solution: Using a Neural Network to Store Intermediate Results
- Neural Network Would Learn to Recognize Known Components/Elements
- For Known Elements, Results Could be Retrieved from Database Instead of Recalculating

GRAPH NEURAL NETWORK ARCHITECTURE

- Input: Geometric, material parameters, loads
- Graph Representation of Structural Components
  - Nodes: Individual components (beams, columns, slabs, etc.)
  - Edges: Connectivity and relationships between components
- Graph Convolutional Layers for Propagating Information
- Hidden Layers for Non-linear Transformations
- Output Layer: Predicted Loads/Stresses/Deformations
- Training on Existing Projects with Verified Results

POTENTIAL BENEFITS

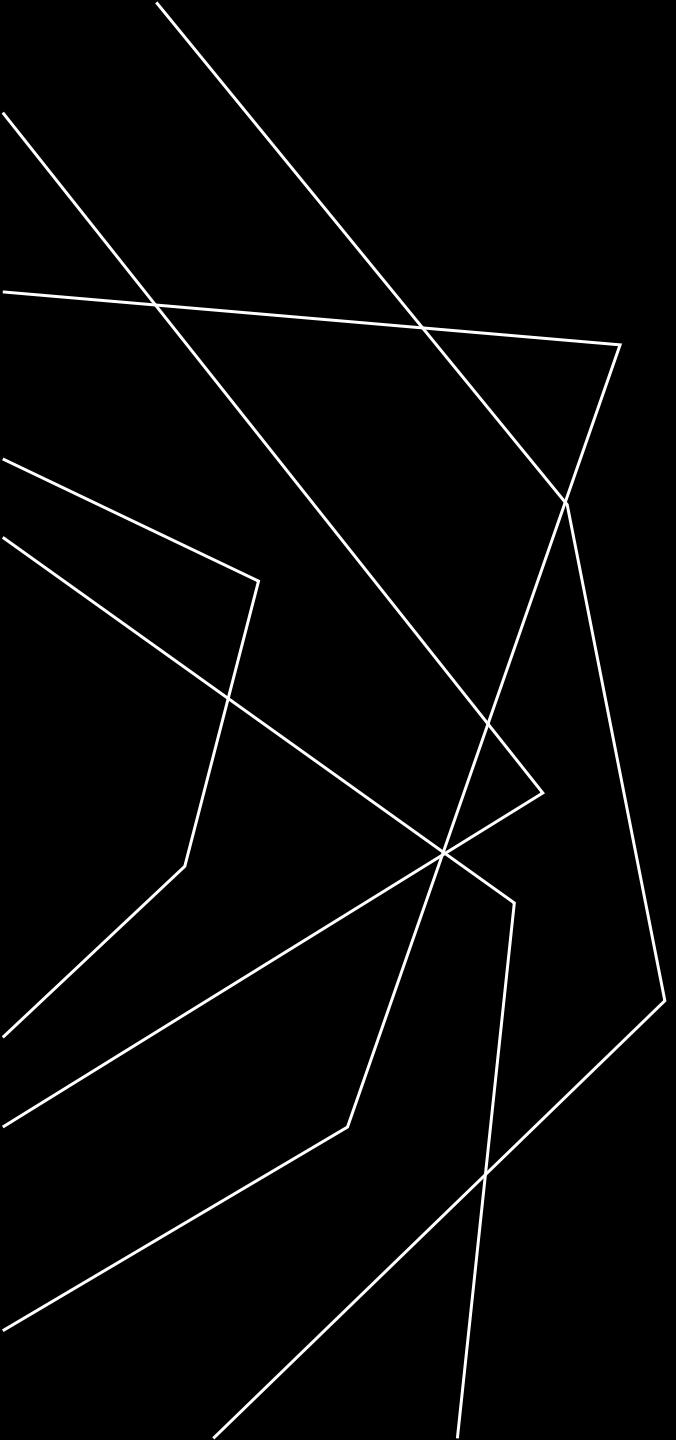
- Reduced Computation Time by Avoiding Recalculations for Known Elements
- Ability to Model Complex Structural Interdependencies
- Improved Accuracy Compared to Traditional Simplified Methods
- Scalability to Handle More Complex Projects
- Efficient Handling of Irregular/Non-Euclidean Structured Data

NEXT STEPS

- Proof-of-Concept Implementation
- Test on Sample Construction Projects
- Benchmark Against Traditional Methods
- Evaluate Feasibility, Accuracy and Potential Savings

IMPLEMENTATION CONSIDERATIONS

- Integration with Existing CAD Systems as an Accelerated Computation Module
- Automatic Graph Construction from CAD Models
- Continuous Learning Mechanism on New Projects
- Certification/Regulatory Challenges for AI Usage



THANK YOU

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