Multilayer Perceptron (MLP) for Structural Health Monitoring of welded bridge joints

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This project aims to investigate the application of machine learning algorithms, specifically the multilayer perceptron(MLP), to characterise the normal correlation pattern between monitored environmental conditions (daily-averaged pavement temperatures), operational loads (daily-aggregated heavy traffic counts) and a strain-based performance indicator, from data collected on the Great Belt Bridge (Denmark).

The objective for this research is to determine model feasibility for implementation in performance assessment and/or performance prediction, within a modern structural health management framework.
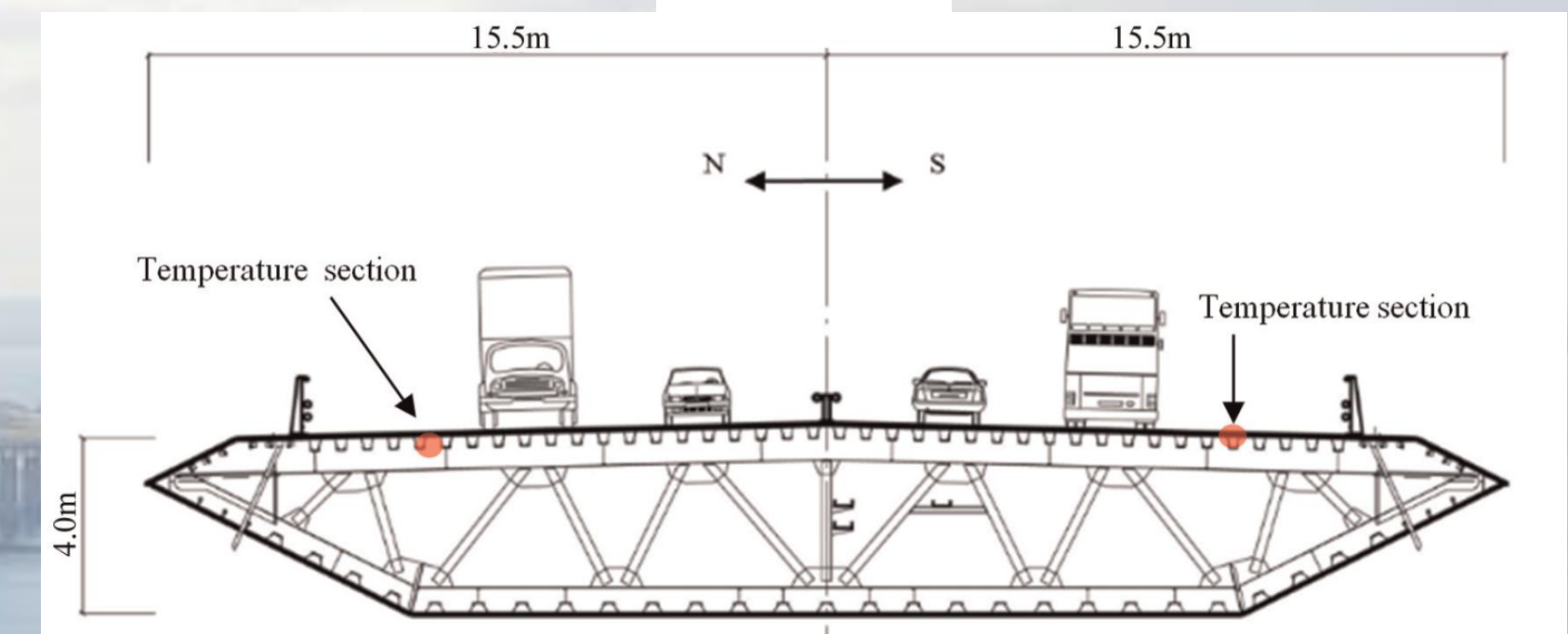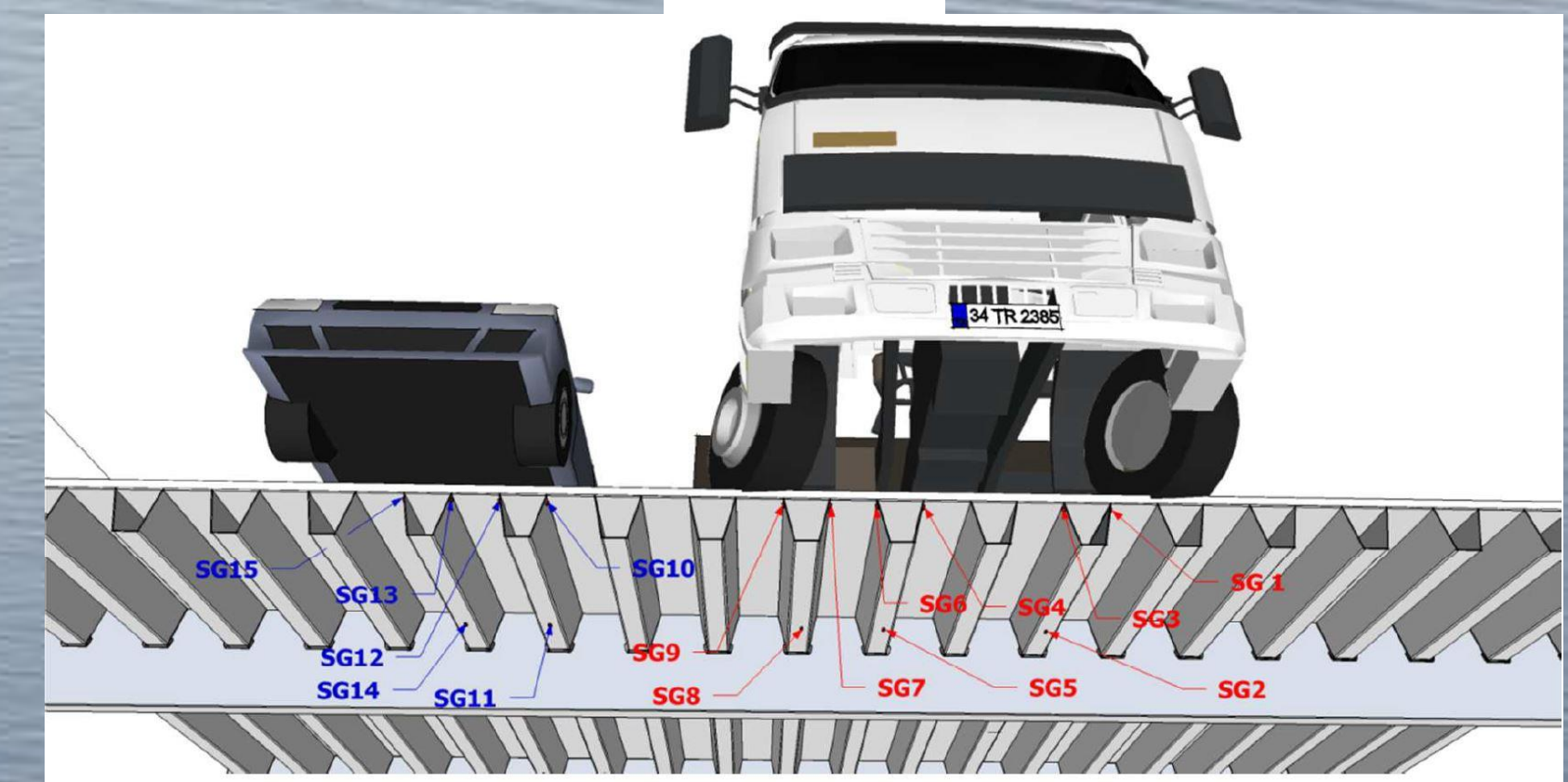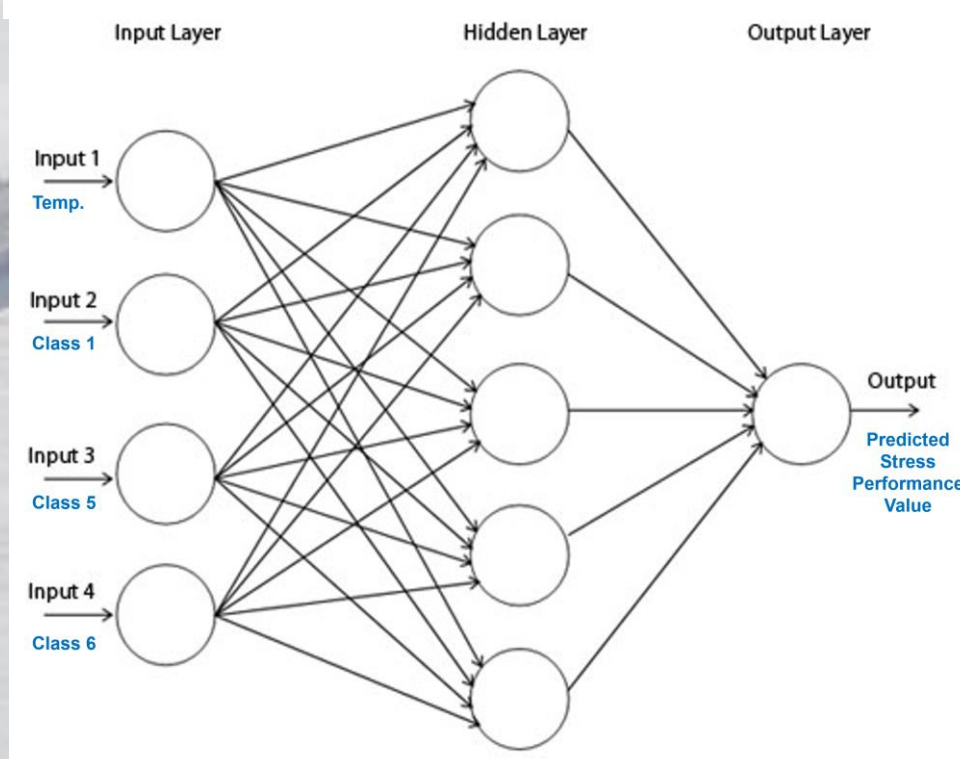
Typical MLP Topology

Technology Stack

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$

Vehicle Characteristics

Vehicle class	Length range (m)	Height range (m)	Approximate vehicle type
I	0–3	No limit	Motorcycle
2	3–6	No limit	Car
3	6–20	<2, 8	Car with trailer
4	6–10	>2, 8	Van
5	10–20	>2, 8	Truck
6	>20	No limit	Articulated truck
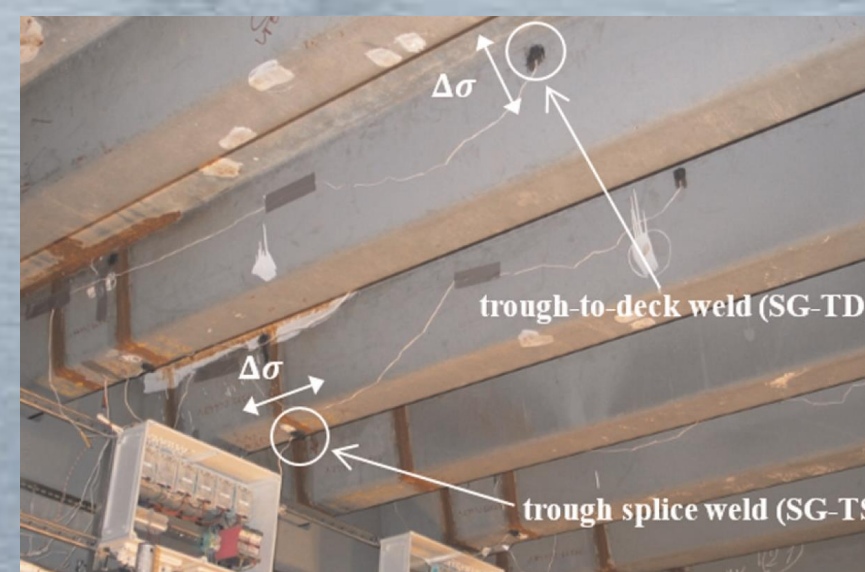
Instrumented Welds

Traffic

Temperature

Strain