

Artificial Intelligence

Neural Networks

Lesson 8: Sensitivity Analysis

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Contents

- Sensitivity analysis

Sensitivity Analysis (1)

- Problem of multi-layer perceptrons
 - The knowledge learned by a neural network is encoded in matrices/vectors of real-valued numbers, often difficult to understand or to extract
 - Geometric interpretation are possible only for very simple networks
 - Neural network is often effectively a *black box*

Sensitivity Analysis (2)

- Sensitivity analysis
 - Find out to which inputs the output(s) react(s) most sensitively
 - Hints about which inputs are not needed and may be discarded
- Approach
 - Determine change of output relative to change of input

$$\forall u \in U_{\text{in}} : \quad s(u) = \frac{1}{|L_{\text{fixed}}|} \sum_{l \in L_{\text{fixed}}} \sum_{v \in U_{\text{out}}} \frac{\partial \text{out}_v^{(l)}}{\partial \text{ext}_u^{(l)}}.$$