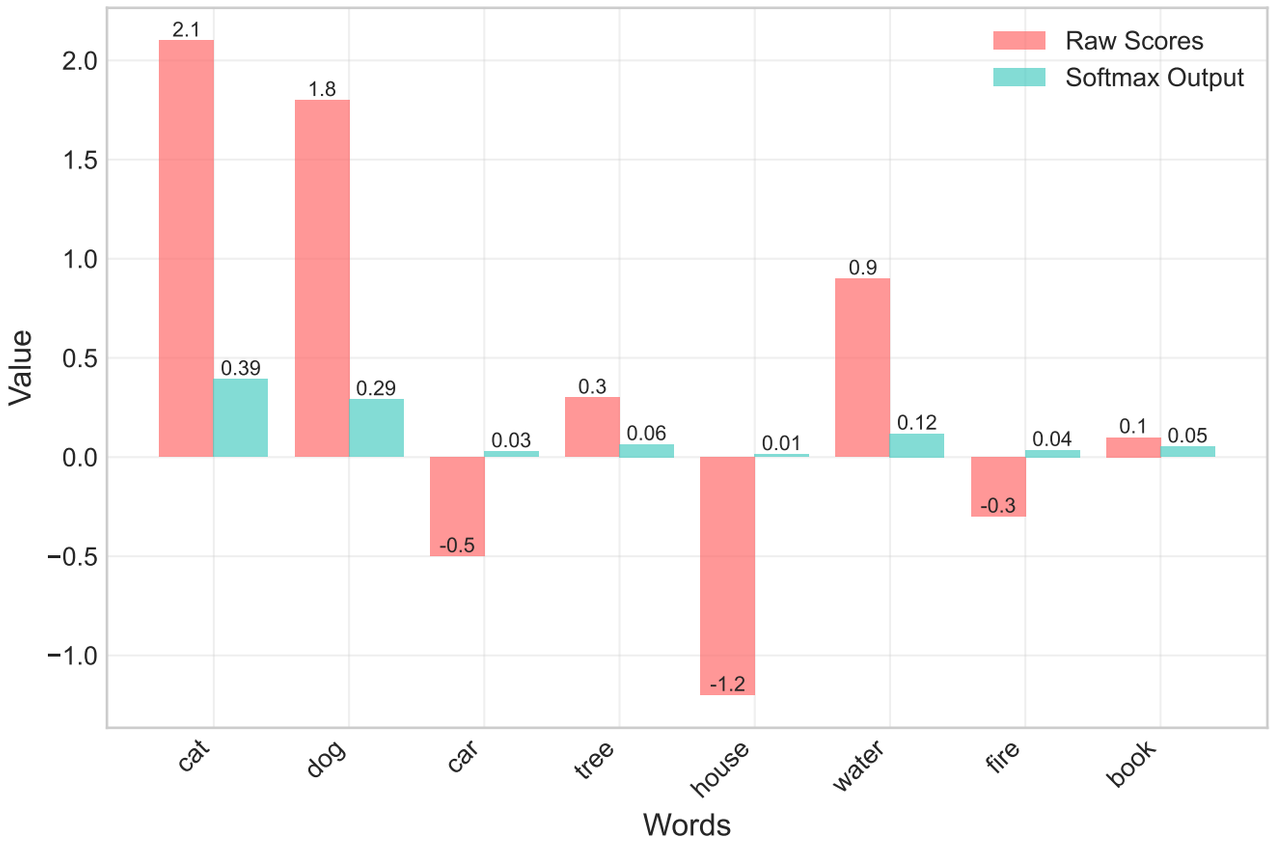
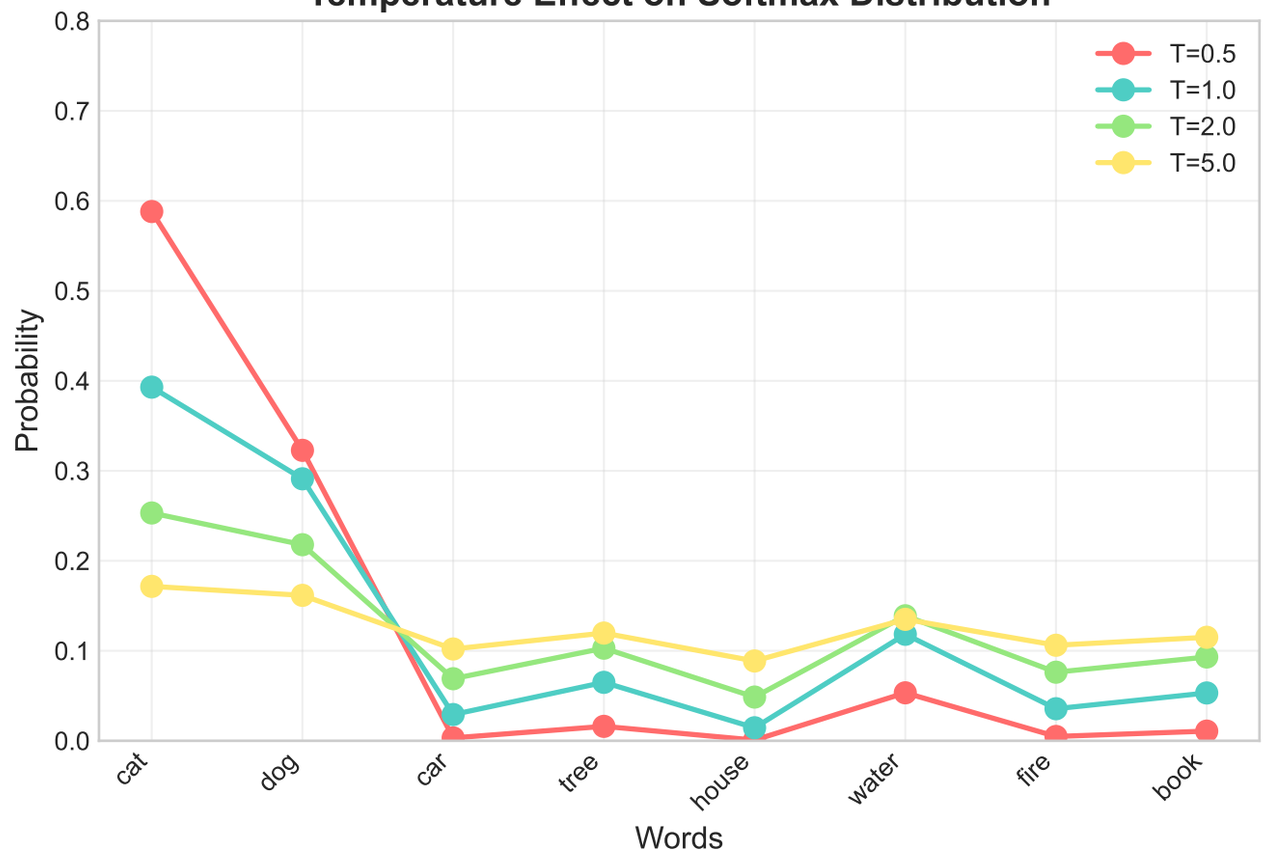
Softmax Function: Converting Scores to Probabilities

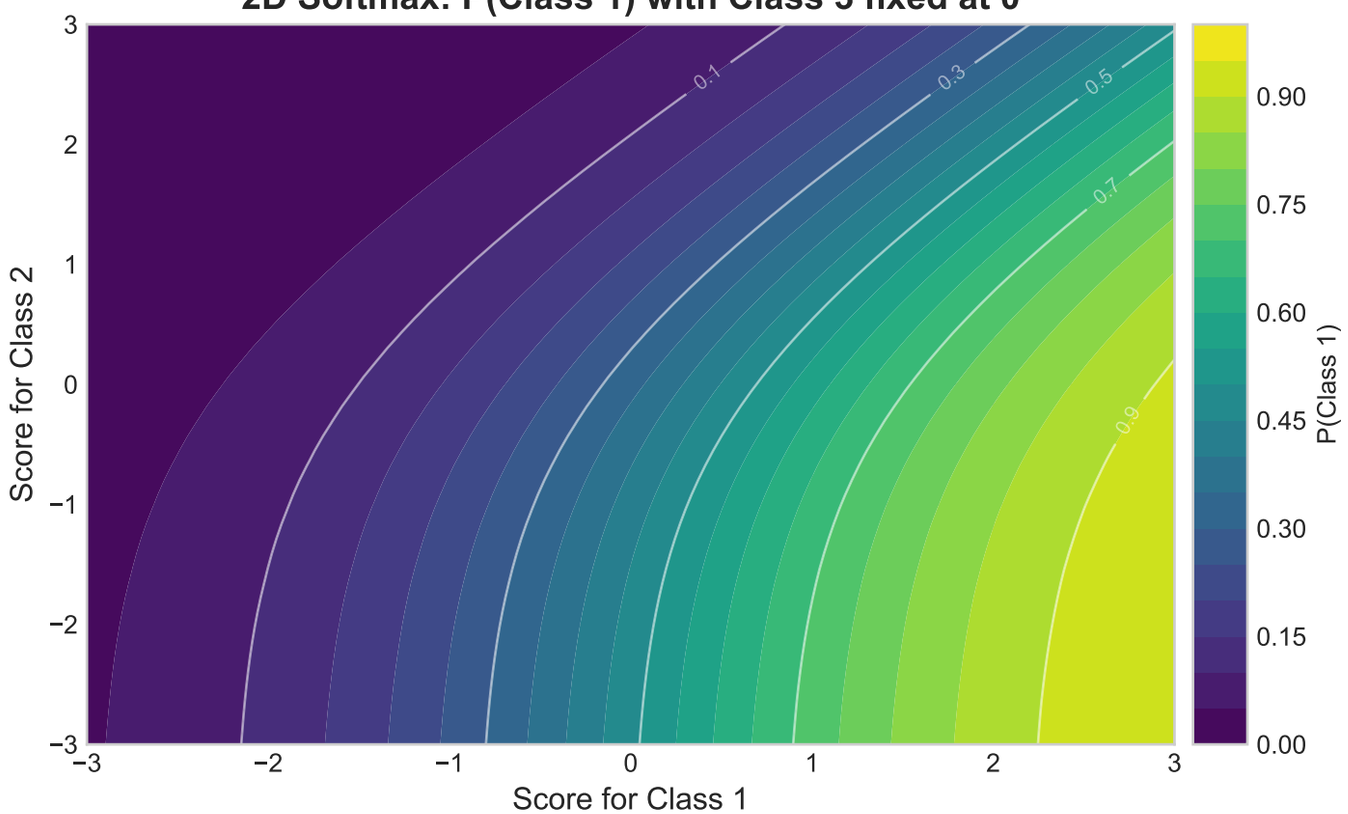
Softmax Transformation: Scores → Probabilities



Temperature Effect on Softmax Distribution



2D Softmax: P(Class 1) with Class 3 fixed at 0



Softmax Formula:

$$\text{Softmax}(x_i) = \frac{e^{x_i}}{\sum_{j=1}^{n} e^{x_j}}$$

Example Calculation:

Input scores: [2.0, 1.0, 0.1]

Step 1: Exponentiate
exp(2.0) = 7.39
exp(1.0) = 2.72
exp(0.1) = 1.11

Step 2: Sum = 7.39 + 2.72 + 1.11 = 11.22

Step 3: Normalize
P□ = 7.39/11.22 = 0.66
P□ = 2.72/11.22 = 0.24
P□ = 1.11/11.22 = 0.10

Output: [0.66, 0.24, 0.10] (sum = 1.0)

Key Properties:
• Output range: [0, 1]
• Sum to 1.0
• Preserves order
• Differentiable