**Lembar Jawaban Kalkulasi Neural Network**

**Pada lembar jawaban ini, kamu dapat menuliskan cara mengkalkulasikan nilai-nilai yang diminta pada arsitektur neural network sesuai soal, ya, semangat!😄**

Pertama, masukkan dulu nilai initial value dan randomnya ya …

**Initial Value**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **x1** | **x2** | **x3** | **α** | **Threshold** | **Yd,6** |
| 0,7 | 0,8 | 0,9 | 0,1 | -1 |  |

**Initial Random**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **W14** | **W15** | **W24** | **W25** | **W34** | **W35** | **W46** | **W56** | **θ4** | **θ5** | **θ6** |
| 0,2 | -0,5 | 0,8 | -0,3 | 0,6 | -0,1 | -0,9 | 0,4 | -1 | -1 | -1 |

Jika sudah selesai, kita akan masuk ke langkah-langkah kalkulasi, sebagai berikut:

**Forward Pass**

Forward Pass merupakan hasil dari langkah 1 pada proses kalkulasi di challenge deck. Oleh karena itu kamu tuliskan langkah kalkulasi yang kamu lakukan untuk mencari nilai-nilai di bawah ini, ya🙌

**Langkah 1: Menghitung output Neuron 4 (y4), Neuron 5 (y5), Neuron 6 (y6), dan Error menggunakan sigmoid function**

|  |  |
| --- | --- |
| Y4 | = sigmoid(0.2×0.7−0.5×0.8+0.8×0.9−1) = |
|  | = sigmoid(−0.54) |
|  | = 0.367 |
| Y5 | = sigmoid(0.2×0.7−0.5×0.8+0.8×0.9−1) |
|  | = sigmoid(−1.72) |
|  | = 0.151 |
| Y6 | = sigmoid(−0.9×y4​+0.4×y5​−1) |
|  | = y6​=sigmoid(−0.9×sigmoid(−0.54)+0.4×sigmoid(−1.72)−1) |
|  | = 0.219​ |
| e | = Yd,5 – y5 |
|  | = 0 – 0.151 |
|  | = -0.151 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| **0.367** | **0.151** | **0.219** | **-0.151** |

**Backward Pass**

Sementara itu, nilai-nilai dari backward pass didapatkan dengan menjalankan langkah 2, 3, dan 4. Jangan lupa tuliskan proses dan hasil kalkulasinya pada tempat yang telah disediakan di bawah, ya👍

**Langkah 2: Hitung error gradient untuk Neuron 6 di Output Layer dan weight corrections**

|  |  |
| --- | --- |
| δ6 | = (0−y6​)×y6​×(1−y6​) |
|  | = −0.219×0.219×0.781 |
|  | = −0.038 |
| ∇46 | = Δw46​=α×δ6​×y4​ |
|  | = Δw46​=0.1×(−0.038)×0.367 |
|  | = −0.0014 |
| ∇56 | = Δw56​=α×δ6​×y5​ |
|  | = 0.1×(−0.038)×0.151 |
|  | = −0.0006 |
| ∇θ6 | = Δθ6​=α×δ6​ |
|  | = Δθ6​=0.1×(−0.038) |
|  | = −0.0038 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| **-0.038** | **-0.0014** | **-0.0006** | **-0.0038** |

**Langkah 3: Hitung error gradients untuk Neuron 4 dan Neuron 5 di Middle Layer/Hidden Layer**

|  |  |
| --- | --- |
| δ4 | = δ6​×w46​×y4​×(1−y4​) |
|  | = −0.038×−0.0014×0.367×(1−0.367) |
|  | = 0.0003 |
| δ5 | = δ6​×w56​×y5​×(1−y5​) |
|  | = δ5​=−0.038×−0.0006×0.151×(1−0.151) |
|  | = −0.0003 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| **0.0003** | **-0.0003** |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | = Δw14​=α×δ4​×x1​ |
|  | = Δw14​=0.1×0.0003×0.7 |
|  | = 0.0000021 |
| ∇w24 | = α×δ4​×x2 |
|  | = 0.1×0.0003×0.8 |
|  | = 0.0000024 |
| ∇w34 | = α×δ4​×x3​ |
|  | = 0.1×0.0003×0.9 |
|  | = 0.0000027 |
| ∇θ4 | = Δθ4​=α×δ4​ |
|  | = 0.1×0.0003 |
|  | = 0.00003 |
| ∇w15 | = Δw15​=α×δ5​×x1​ |
|  | = 0.1×−0.0003×0.7 |
|  | = −0.0000021 |
| ∇w25 | = Δw25​=α×δ5​×x2​ |
|  | = 0.1×−0.0003×0.8 |
|  | = −0.0000024 |
| ∇w35 | = α×δ5​×x3​ |
|  | = 0.1×−0.0003×0.9 |
|  | = −0.0000027 |
| ∇θ5 | = α×δ5​ |
|  | = 0.1×−0.0003 |
|  | = −0.00003 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| **0.0000021** | **0.0000024** | **0.0000027** | **0.00003** | **-0.0000021** | **-0.0000024** | **-0.0000027** | **-0.00003** |

**Backward Pass**

Last but not least, adalah nilai-nilai dari updated weight didapatkan dengan menjalankan langkah nomor 5. Seperti biasa, tuliskan proses dan hasil kalkulasinya pada tempat yang telah disediakan di bawah, ya👌

**Langkah 5: Hitung semua weights dan theta pada arsitektur yang telah diperbarui**

|  |  |
| --- | --- |
| w14 | = w14​+Δw14​ |
|  | = 0.2+0.0000021 |
|  | = 0.2000021 |
| w15 | = w15​=w15​+Δw15​ |
|  | = −0.5−0.0000021 |
|  | = −0.5000021 |
| w24 | = w24​+Δw24​ |
|  | = 0.8+0.0000024 |
|  | = 0.8000024 |
| w25 | = w25​+Δw25​ |
|  | = −0.3−0.0000024 |
|  | = −0.3000024 |
| w34 | = w34​+Δw34 |
|  | = 0.6+0.0000027 |
|  | = 0.6000027 |
| w35 | = w35​+Δw35​ |
|  | = −0.1−0.0000027 |
|  | = −0.1000027 |
| θ4 | = θ4​+Δθ4​ |
|  | = −1+0.00003 |
|  | = −0.99997 |
| θ5 | = θ5​=θ5​+Δθ5​ |
|  | = −1−0.00003 |
|  | = −1.00003 |
| θ6 | = θ6​+Δθ6​ |
|  | = −1−0.0038 |
|  | = −1.0038 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **θ3** | **θ4** | **θ5** |
| **0.2000021** | **-0.5000021** | **0.8000024** | **-0.3000024** | **0.6000027** | **-0.000027** | **-0.99997** | **-1.00003** | **-1.0038** |

**Hore, kamu sudah menyelesaikan satu dari tiga proyek challenge, semoga mendapatkan hasil yang maksimal dan selamat bersenang-senang~**