**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 | -1.0 | 0 |

**Initial Random**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **W14** | **W15** | **W24** | **W25** | **W34** | **W35** | **W46** | **W56** | **θ4** | **θ5** | **θ6** |
| 0.5 | 0.6 | 0.3 | 1.1 | -1.0 | 0.1 | -1.1 | -0.7 | 0.2 | 0.3 | 0.4 |

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 (X1W14 + X2W24 + X3W34 + θ4 \* Threshold) |
|  | = 0.6248064744684293 |
|  | = |
| Y5 | = Sigmoid (X1W15 + X2W25 + X3W35 + θ5 \* Threshold) |
|  | = 0.25161827839293577 |
|  | = |
| Y6 | = Sigmoid (Y4W46 + Y5W56 + θ6 \* Threshold) |
|  | = 0.7796142655898279 |
|  | = |
| e | = Yd,6 – Y6 |
|  | = 0 – 0.78 |
|  | = -0.78 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| 0.625 | 0.252 | 0.78 | -0.78 |

**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 | = Y6 (1 – Y6) e |
|  | = 0.78 \* (1 – 0.78) \* (-0.78) |
|  | = 0.13395009744298428 |
| ∇46 | = α \* Y4 \* δ6 |
|  | = 0.1 \* 0.625 \* 0.134 |
|  | = 0.008369288813805357 |
| ∇56 | = α \* Y5 \* δ6 |
|  | = 0.1 \* 0.252 \* 0.134 |
|  | = 0.0033704292909169696 |
| ∇θ6 | = α \* Threshold \* δ6 |
|  | = 0.1 \* (-1.0) \* (0.134) |
|  | = -0.013395009744298428 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| 0.134 | 0.008 | 0.003 | -0.013 |

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

|  |  |
| --- | --- |
| δ4 | = Sigmoid\_derivative(Y­­4) \* δ6 \* W46 |
|  | = Sigmoid\_derivative (0.625) \* 0.134 \* (-1.1) |
|  | = 0.034541132738679266 |
| δ5 | = Sigmoid\_derivative(Y­­5) \* δ6 \* W56 |
|  | = Sigmoid\_derivative(0.252) \* 0.134\* (-0.7) |
|  | = 0.017656573727039226 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| 0.035 | 0.018 |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | = α \* X1 \* δ4 |
|  | = 0.0024178792917075483 |
|  | = |
| ∇w24 | = α \* X2 \* δ4 |
|  | = 0.0027632906190943416 |
|  | = |
| ∇w34 | = α \* X3 \* δ4 |
|  | = 0.003108701946481134 |
|  | = |
| ∇θ4 | = α \* Threshold \* δ4 |
|  | = -0.0034541132738679266 |
|  | = |
| ∇w15 | = α \* X1 \* δ5 |
|  | = 0.0012359601608927457 |
|  | = |
| ∇w25 | = α \* X2 \* δ5 |
|  | = 0.0014125258981631382 |
|  | = |
| ∇w35 | = α \* X3 \* δ5 |
|  | = 0.0015890916354335306 |
|  | = |
| ∇θ5 | = α \* Threshold \* δ5 |
|  | = -0.0017656573727039227 |
|  | = |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| 0.002 | 0.003 | 0.003 | -0.003 | 0.001 | 0.001 | 0.002 | -0.002 |

**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 + ∇W14 |
|  | = 0.5 + 0.002 |
|  | = 0.5024178792917076 |
| w15 | = W15 + ∇W15 |
|  | = 0.6 + 0.001 |
|  | = 0.6012359601608928 |
| w24 | = W24 + ∇W24 |
|  | = 0.3 + 0.003 |
|  | = 0.30276329061909435 |
| w25 | = W25 + ∇W25 |
|  | = 1.1 + 0.001 |
|  | = 1.1014125258981633 |
| w34 | = W34 + ∇W34 |
|  | = -1.0 + 0.003 |
|  | = -0.9968912980535188 |
| w35 | = W35 + ∇W35 |
|  | = 0.1 + 0.002 |
|  | = 0.10158909163543353 |
| θ4 | = θ4 + ∇θ4 |
|  | = 0.2 + (-0.003) |
|  | = 0.19654588672613207 |
| θ5 | = θ5 + ∇θ5 |
|  | = 0.3 + (-0.002) |
|  | = 0.2982343426272961 |
| θ6 | = θ6 + ∇θ6 |
|  | = 0.4 + (-0.013) |
|  | = 0.3866049902557016 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **Θ4** | **Θ5** | **Θ6** |
| 0.502 | 0.601 | 0.303 | 1.101 | -0.997 | 0.102 | 0.197 | 0.197 | 0.387 |

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