**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** |

**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 + Threshold θ4)** |
|  | **= 1 / [1 + e-(0.7x0.5 + 0.8x0.4 + 0.9x(-1.0) + (-1)x0.2)]** |
|  | **= 0.3751** |
| **Y5** | **= sigmoid(X1W15 + X2W25 + X3W35 + Threshold θ5)** |
|  | **= 1 / [1 + e-(0.7x0.6 + 0.8x1.1 + 0.9x0.1 + (-1)x0.3)]** |
|  | **= 0.7483** |
| **Y6** | **= sigmoid(Y4W46 + Y5W56 + Threshold θ6)** |
|  | **= 1 / [1 + e-(0.3751x(-1.1) + 0.7483x(-0.7) + (-1)x0.4)]** |
|  | **= 0.2080** |
| **e** | **= Yd,6 – Y6** |
|  | **= 0 – 0.2080** |
|  | **= -0.2080** |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| **0.3751** | **0.7483** | **0.2080** | **-0.2080** |

**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** |
|  | **= 0.2080 x (1 - 0.2080) x (-0.2080)** |
|  | **= -0.0343** |
| **∇46** | **= α x Y4 x δ6** |
|  | **= 0.1 x 0.3751 x (-0.1409)** |
|  | **= -0.0013** |
| **∇56** | **= α x Y5 x δ6** |
|  | **= 0.1 x 0.748 x (-0.1383)** |
|  | **= -0.0026** |
| **∇θ6** | **= α x (-1)x δ6** |
|  | **= 0.1 x (-1) x (-0.1383)** |
|  | **= 0.0034** |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| **-0.0343** | **-0.0013** | **-0.0026** | **0.0034** |

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

|  |  |
| --- | --- |
| **δ4** | **= Y4(1-Y4) x δ6 x W46** |
|  | **= 0.3751 x (1-0.3751) x (-0.0343) x (-1.1)** |
|  | **= 0.0088** |
| **δ5** | **= Y5(1-Y5) x δ6 x W56** |
|  | **= 0.7483 x (1-0.7483) x (-0.0343) x (-0.7)** |
|  | **= 0.0045** |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| **0.0088** | **0.0045** |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| **∇w14** | **= α x X1 x δ4** |
|  | **= 0.1 x 0.7 x 0.0088** |
|  | **= 0.0006** |
| **∇w24** | **= α x X2 x δ4** |
|  | **= 0.1 x 0.8 x 0.0088** |
|  | **= 0.0007** |
| **∇w34** | **= α x X3 x δ4** |
|  | **= 0.1 x 0.9 x 0.0088** |
|  | **= 0.0008** |
| **∇θ4** | **= α x (-1) x δ4** |
|  | **= 0.1 x (-1) x 0.0088** |
|  | **= -0.0009** |
| **∇w15** | **= α x X1 x δ5** |
|  | **= 0.1 x 0.7 x 0.0045** |
|  | **= 0.0003** |
| **∇w25** | **= α x X2 x δ5** |
|  | **= 0.1 x 0.8 x 0.0045** |
|  | **= 0.0004** |
| **∇w35** | **= α x X3 x δ5** |
|  | **= 0.1 x 0.9 x 0.0045** |
|  | **= 0.004** |
| **∇θ5** | **= α x (-1) x δ5** |
|  | **= 0.1 x (-1) x 0.0045** |
|  | **= 0.0005** |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| **0.0006** | **0.0007** | **0.0008** | **-0.0009** | **0.0003** | **0.0004** | **0.0004** | **-0.0005** |

**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 + 0.0006** |
|  | **= 0.5006** |
| **w15** | **= W15 + ∇w15** |
|  | **= 0.6 + 0.0003** |
|  | **= 0.6003** |
| **w24** | **= W24 + ∇w24** |
|  | **= 0.3 + 0.0007** |
|  | **= 0.3007** |
| **w25** | **= W25 + ∇w25** |
|  | **= 1.1+ 0.0004** |
|  | **= 1.1004** |
| **w34** | **= W34 + ∇w34** |
|  | **= -1.0 + 0.0008** |
|  | **= -0.9992** |
| **w35** | **= W35 + ∇w35** |
|  | **= 0.1 + 0.0004** |
|  | **= 0.1004** |
| **θ4** | **= θ4 + ∇θ4** |
|  | **= 0.2 + (-0.0009)** |
|  | **= 0.1991** |
| **θ5** | **= θ5 + ∇θ5** |
|  | **= 0.3 + (-0.0005)** |
|  | **= 0.2995** |
| **θ6** | **= θ6 + ∇θ6** |
|  | **= 0.4 + 0.0034** |
|  | **= 0.4034** |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **θ4** | **θ4** | **θ5** |
| **0.5006** | **0.6003** | **0.3007** | **1.1004** | **-0.9992** | **0.1004** | **0.1991** | **0.2995** | **0.4034** |

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