**Lembar Jawaban Kalkulasi Neural Network**

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

Diagram

Description automatically generated

Pertama, masukkan dulu nilai initial value dan initial 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((X1\*W14 )+ (X2\*W24) + (X3\*W34) + (-1\*θ4)) |
|  | = 1 / [1 + e –((0.7\*0.5) + (0.8\*0.3) + (0.9\*-1.0) – (1\*0.2))] |
|  | = 0.3752 |
| Y5 | = Sigmoid((X1\*W15 )+ (X2\*W25) + (X3\*W35) + (-1\*θ5)) |
|  | = 1 / [1 + e –((0.7\*0.6) + (0.8\*1.1) + (0.9\*0.1) – (1\*0.3))] |
|  | = 0.7130 |
| Y6 | = Sigmoid((Y4\*W46 )+ (Y5\*W56) + (-1\*θ6)) |
|  | = 1 / [1 + e –((0.3752\*0.6) + (0.7130\*1.1) – (1\*0.4))] |
|  | = 0.2081 |
| e | = Yd,6 – Y6 |
|  | =0 - 0. 2081 |
|  | =-0. 2081 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| **0.3752** | **0.7484** | **0. 2081** | **-0.** **2081** |

**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 |
|  | = 0.2081\* (1 - 0. 2081)\* -0.2081 |
|  | = -0.0343 |
| ∇46 | = α \* Y4 \* δ6 |
|  | = 0.1 \* 0.3752 \* -0.0343 |
|  | = -0.0013 |
| ∇56 | = α \* Y5 \* δ6 |
|  | = 0.1 \* 0.7484\* -0.0343 |
|  | =-0.0026 |
| ∇θ6 | = α \* -1 \* δ6 |
|  | = 0.1 \* -1 \* -0.0343 |
|  | = 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) \* δ6 \* W46 |
|  | = 0.3752 \* (1 - 0.3752) \* -0.0343\* -1.1 |
|  | = 0.0088 |
| δ5 | = Y5(1-Y5) \* δ6 \* W56 |
|  | = 0.7484\* (1 - 0.7484) \* -0.0343\* -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 \* X1 \* δ4 |
|  | = 0.1 \* 0.7 \* 0.0088 |
|  | = 0.0006 |
| ∇w24 | = α \* X2 \* δ4 |
|  | = 0.1 \* 0.8 \* 0.0088 |
|  | = 0.0007 |
| ∇w34 | = α \* X3 \* δ4 |
|  | = 0.1 \* 0.9 \* 0.0088 |
|  | = 0.0008 |
| ∇w15 | = α \* X1 \* δ5 |
|  | = 0.1 \* 0.7 \* 0.0045 |
|  | = 0.0003 |
| ∇w25 | = α \* X2 \* δ5 |
|  | = 0.1 \* 0.8 \* 0.0045 |
|  | = 0.0004 |
| ∇w35 | = α \* X3 \* δ5 |
|  | = 0.1 \* 0.9 \* 0.0045 |
|  | = 0.0004 |
| ∇θ4 | = α \* -1 \* δ4 |
|  | = 0.1 \* -1 \* 0.0088 |
|  | = -0.0009 |
| ∇θ5 | = α \* -1 \* δ5 |
|  | = 0.1 \* -1 \* 0.0045 |
|  | =-0.0005 |
| ∇θ6 | = α \* -1 \* δ6 |
|  | = 0.1 \* -1 \* -0.0343 |
|  | = 0.00 = 0.0034 |
|  |  |
|  |  |
|  |  |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** | **∇θ6** |
| **0.0006** | **0.0007** | **0.0008** | **-0.0009** | **0.0003** | **0.0004** | **0.0004** | **-0.0005** | **0.0034** |

**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 |
|  | = 0.5 + 0.0006 |
|  | = 0.5006 |
| w15 | = W15 + ΔW15 |
|  | = 0.6 + 0.0004 |
|  | = 0.6003 |
| w24 | = W24 + ΔW24 |
|  | = 0.3 + 0.0007 |
|  | = 0.3007 |
| w25 | = W25 + ΔW25 |
|  | = 1.1 + 0.0004 |
|  | = 1.1004 |
| w34 | = W34 + ΔW34 |
|  | = -1.0 + 0.0008 |
|  | = -0.9992 |
| w35 | = W35 + ΔW35 |
|  | = 0.1 + 0.0005 |
|  | = 0.1004 |
| θ4 | = θ4 + Δθ4 |
|  | = 0.2 + -0.0009 |
|  | = 0.1991 |
| θ5 | = θ5 + Δθ5 |
|  | = 0.3 + -0.0005 |
|  | = 0.2995 |
| θ6 | = θ6 + Δθ6 |
|  | = 0.4 + 0.0034 |
|  | = 0.4034 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **Θ4** | **Θ5** | **Θ6** |
| **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 platinum! Semoga mendapatkan hasil yang maksimal dan selamat bersenang-senang~**