**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(w14\*x1 + w24\*x2 + w34\*x3 + theta4) |
| --- | --- |
|  | = 1 / [ 1 + e – (0,6\*0,7 + 0,3\*0,8 + 1\*0,9 + 0,4) |
|  | = 0.47252769565540637 |
| Y5 | = sigmoid(w15\*x1 + w25\*x2 + w35\*x3 - theta5) |
|  | = 1 / [ 1 + e – (0,5\*0,7 + 1,1\*0,8 + 0,1\*0,9 + 0,3) |
|  | =0.7483817216070642 |
| Y6 | = sigmoid(w46\*output3 + w56\*output4 - theta6) |
|  | =1 / [ 1 + e – (-1,1\*0.47252769565540637+ -0,7\*0.7483817216070642 - 0,4) |
|  | =0.19098112137521467 |
| e | = y d,6 – y6 |
|  | = 0 - 0.19098112137521467 |
|  | = - 0.19098112137521467 |

Lalu isi rangkuman hasilnya di tabel ini ya …

| **Y4** | **Y5** | **Y6** | **e** |
| --- | --- | --- | --- |
| 0.47252769565540637 | 0.7483817216070642 | 0.19098112137521467 | - 0.19098112137521467 |

**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 | = (actual\_output – output6) \* sigmoid\_derivative(output6) |
| --- | --- |
|  | = 0.19098112137521467 \* ( 1 - 0.19098112137521467 ) \* (- 0.19098112137521467) |
|  | = - 0.0295 |
| ∇46 | = learning\_rate \* dError\_dWeight46 |
|  | = 0.1 \* 0.47252769565540637 \* ( - 0.0295 ) |
|  | = -0.0014 |
| ∇56 | = learning\_rate \* dError\_dWeight56 |
|  | = 0.1 \* 0.7483817216070642 \* ( - 0.0295 ) |
|  | = -0.0022 |
| ∇θ6 | = learning\_rate \* dError\_dtheta6 |
|  | = 0.1 \* ( -1 ) \* ( - 0.0295 ) |
|  | = 0.0030 |
|  |  |

Lalu isi rangkuman hasilnya di tabel ini ya …

| **δ6** | **∇46** | **∇56** | **∇θ6** |
| --- | --- | --- | --- |
| **-0,0295** | **-0,0014** | **-0,0022** | **0,0030** |

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

| δ4 | =sigmoid\_derivative(output4) \* gradient\_6 \* w46 |
| --- | --- |
|  | = 0.47252769565540637 \* ( 1 - 0.47252769565540637 ) \* ( -0,0295 ) \* (-1,1) |
|  | = 0.0081 |
| δ5 | =sigmoid\_derivative(output5) \* gradient\_6 \* w56 |
|  | = 0.7483817216070642 \* ( 1 - 0.7483817216070642 ) \* ( -0,0295 ) \* (-0,7) |
|  | =0.0039 |

Lalu isi rangkuman hasilnya di tabel ini ya …

| **δ4** | **δ5** |
| --- | --- |
| **0,0081** | **0,0039** |

**Langkah 4: Hitung weight corrections**

| ∇w14 | = learning\_rate \* x1 \* gradient\_4 |
| --- | --- |
|  | = 0,1 \* 0,7 \* 0.0081 |
|  | = 0,0006 |
| ∇w24 | = learning\_rate \* x2 \* gradient\_4 |
|  | = 0,1 \* 0,8 \* 0.0081 |
|  | = 0,0006 |
| ∇w34 | = learning\_rate \* x3 \* gradient\_4 |
|  | = 0,1 \* 0,8 \* 0.0081 |
|  | = 0,0007 |
| ∇θ4 | = learning\_rate \* thresold \* gradient\_4 |
|  | = 0,1 \* ( -1) \* 0.0081 |
|  | = - 0,0008 |
| ∇w15 | = learning\_rate \* x1 \* gradient\_5 |
|  | = 0,1 \* 0,7 \* 0.0039 |
|  | = 0,0006 |
| ∇w25 | = learning\_rate \* x2 \* gradient\_5 |
|  | = 0,1 \* 0,8 \* 0.0039 |
|  | = 0,0006 |
| ∇w35 | = learning\_rate \* x3 \* gradient\_5 |
|  | = 0,1 \* 0,8 \* 0.0039 |
|  | = 0,0004 |
| ∇θ5 | = learning\_rate \* thresold \* gradient\_5 |
|  | = 0,1 \* ( -1) \* 0.0039 |
|  | = - 0,0004 |

Lalu isi rangkuman hasilnya di tabel ini ya …

| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **0,0006** | **0,0006** | **0,0007** | **-0,0008** | **0,0006** | **0,0006** | **0,0004** | **-0,0004** |

**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 + delta\_weight14 |
| --- | --- |
|  | = 0,5 + 0,0006 |
|  | = 0,50006 |
| w15 | = w15 + delta\_weight15 |
|  | = 0,6 + 0,0006 |
|  | = 0,60003 |
| w24 | = w24 + delta\_weight24 |
|  | = 0,3 + 0,0006 |
|  | = 0,30006 |
| w25 | = w25 + delta\_weight25 |
|  | = 1,1 + 0,0006 |
|  | = 1, 1003 |
| w34 | = w34 + delta\_weight34 |
|  | = -0,1 + 0,0007 |
|  | = - 0,9993 |
| w35 | = w35 + delta\_weight35 |
|  | = 0,1 + 0,0004 |
|  | = 0,10004 |
| θ4 | = theta4 + delta\_theta4 |
|  | = 0,2 + ( - 0,0008 ) |
|  | = 0, 1992 |
| θ5 | = theta5 + delta\_theta5 |
|  | = 0,3 + ( - 0,0004 ) |
|  | = 0,2996 |
| θ6 | = theta6 + delta\_theta6 |
|  | = 0,4 + 0,0030 |
|  | = 0,4030 |

Lalu isi rangkuman hasilnya di tabel ini ya …

| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **Θ4** | **Θ5** | **Θ6** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0,5006** | **0,6003** | **0,3006** | **1,1003** | **-0,9994** | **0,1004** | **0,1992** | **0,2996** | **0,4030** |

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