**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!😄**

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(X1W14+X2W24+X3W34-θ4) |
|  | =1/(1+e-(0,7 x 0,5 + 0,8 x 0,3 + 0,9 x -1,0 - 1 x 0,2)) |
|  | = 0,37519 |
| Y5 | = sigmoid(X1W15+X2W25+X3W35-θ5) |
|  | =1/(1+e-(0,7 x 0,6 + 0,8 x 1,1 + 0,9 x 0,1 - 1 x 0,3)) |
|  | = 0,74838 |
| Y6 | = sigmoid(Y4W46+Y5W56-θ6) |
|  | =1/(1+e-(0,3751 x -1,1 + 0,7483 x -0,7 - 1 x 0,4)) |
|  | = 0,20810 |
| e | =Yd6-Y6 |
|  | =0-0,208 |
|  | = -0,20810 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| **0,37519** | **0,74838** | **0,20810** | **-0,20810** |

**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 |
|  | =0,20810(1-0,20810) × (-0,20810) |
|  | = -0,03429 |
| ∇46 | =α × Y4 × δ6 |
|  | =0,1 × 0,37519 × -0,03429 |
|  | = -0,00128 |
| ∇56 | = α × Y5 × δ6 |
|  | =0,1 × 0,74838 × -0,03429 |
|  | =-0,00257 |
| ∇θ6 | = α × (-1) × δ6 |
|  | =0,1 × (-1) × -0,03429 |
|  | =0,00342 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| **-0,03429** | **-0,00128** | **-0,00257** | **0,00342** |

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

|  |  |
| --- | --- |
| δ4 | = Y4(1-Y4) × δ6 × W46 |
|  | =0,37519 × (1-0,37519) × -0,03429× -1,1 |
|  | =0,00884 |
| δ5 | = Y5(1-Y5) × δ6 × W56 |
|  | =0,74838 × (1-0,74838) × -0,03429× (-0,7) |
|  | =0,00452 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| **0,00884** | **0,00452** |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | = α × X1 × δ4 |
|  | =0,1 × 0,7 × 0,00884 |
|  | =0,00062 |
| ∇w24 | = α × X2 × δ4 |
|  | =0,1 × 0,8 × 0,00884 |
|  | =0,00071 |
| ∇w34 | = α × X3 × δ4 |
|  | =0,1 × 0,9 × 0,00884 |
|  | =0,00079 |
| ∇θ4 | = α × (-1) × δ4 |
|  | =0,1 × (-1) × 0,00884 |
|  | = -0,00088 |
| ∇w15 | = α × X1 × δ5 |
|  | =0,1 × 0,7 × 0,00452 |
|  | =0,00032 |
| ∇w25 | = α × X2 × δ5 |
|  | =0,1 × 0,8 × 0,00452 |
|  | =0,00036 |
| ∇w35 | = α × X3 × δ5 |
|  | =0,1×0,9×0,00452 |
|  | =0,00041 |
| ∇θ5 | = α×(-1)× δ5 |
|  | =0,1×(-1)× 0,0045 |
|  | = -0,00045 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| **0,00062** | **0,00071** | **0,00079** | **-0,00088** | **0,00032** | **0,00036** | **0,00041** | **-0,00045** |

**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 + 0,00062 |
|  | =0,500612 |
| w15 | = W15 + ∇w15 |
|  | =0,6+0,00032 |
|  | =0,60032 |
| w24 | = W24 + ∇w24 |
|  | =0,3+0,00071 |
|  | =0,30071 |
| w25 | = W25 + ∇w25 |
|  | =1,1+0,00036 |
|  | =1,10036 |
| w34 | = W34 + ∇w34 |
|  | =-1,0+0,00079 |
|  | = -0,99921 |
| w35 | = W35 + ∇w35 |
|  | =0,1+0,00041 |
|  | =0,10041 |
| θ4 | = θ4 + ∇ θ4 |
|  | =0,2+ (-0,00088) |
|  | =0,19912 |
| θ5 | = θ5+ ∇ θ5 |
|  | =0,3+ (-0,00045) |
|  | =0,29955 |
| θ6 | = θ6 + ∇ θ6 |
|  | =0,4+0,0034265 |
|  | =0,40342 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **Θ4** | **Θ5** | **Θ6** |
| **0,50062** | **0,60032** | **0,30071** | **1,10036** | **-0,99921** | **0,10041** | **0,19912** | **0,29955** | **0,40342** |

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