**Lembar Jawaban Kalkulasi Neural Network**

**FAZA HANIFANDRA – DSC230800006**

**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 | 0.1 | -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 / |
|  | = 0.3752 |
| Y5 | = sigmoid (x1w15 + x2w25 + x3w35 – θ5) |
|  | = 1 / |
|  | = 0.7484 |
| Y6 | = sigmoid (y4w46 + y5w56 – θ6) |
|  | = 1 / |
|  | = 0.208 |
| e | = Yd,6– Y6 |
|  | = 0 – 0.208 |
|  | = -0.208 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| **0.3752** | **0.7484** | **0.208** | **-0.208** |

**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 |
|  | = 0.208 x (1 – 0.208) x (-0.208) |
|  | = -0.0343 |
| ∇46 | = α x y4 x δ6 |
|  | = 0.1 x 0.3752 x (-0.0343) |
|  | = −0.00128 |
| ∇56 | = α x y5 x δ6 |
|  | = 0.1 x 0.7484 x (-0.0343) |
|  | = −0.00256 |
| ∇θ6 | = α x (-1)x δ6 |
|  | = 0.1 x (-1) x (-0.0343) |
|  | = 0.00343 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| -0.0343 | −0.00128 | −0.00256 | 0.00343 |

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

|  |  |
| --- | --- |
| δ4 | = y4(1- y4) x δ6 x w46 |
|  | = 0.3752 x (1-0.3752) x (-0.0343) x (-1.1) |
|  | = 0.00884 |
| δ5 | = y5(1- y5) x δ6 x w45 |
|  | = 0.7484 x (1-0.7484) x (-0.0343) x (-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 x X1 x δ4 |
|  | = 0.1 x 0.7 x 0.00884 |
|  | = 0.000619 |
| ∇w24 | = α x X2 x δ4 |
|  | = 0.1 x 0.8 x 0.00884 |
|  | = 0.000707 |
| ∇w34 | = α x X3 x δ4 |
|  | = 0.1 x 0.9 x 0.00884 |
|  | = 0.000795 |
| ∇θ4 | = α x (-1) x δ4 |
|  | = 0.1 x (-1) x 0.00884 |
|  | = -0.000884 |
| ∇w15 | = α x X1 x δ5 |
|  | = 0.1 x 0.7 x 0.00452 |
|  | = 0.000316 |
| ∇w25 | = α x X2 x δ5 |
|  | = 0.1 x 0.8 x 0.00452 |
|  | = 0.000362 |
| ∇w35 | = α x X3 x δ5 |
|  | = 0.1 x 0.9 x 0.00452 |
|  | = 0.000407 |
| ∇θ5 | = α x (-1) x δ5 |
|  | = 0.1 x (-1) x 0.00452 |
|  | = -0.000452 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| 0.000619 | 0.000707 | 0.000795 | -0.000884 | 0.000316 | 0.000362 | 0.000407 | -0.000452 |

**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 + 0.000619 |
|  | = 0.500619 |
| w15 | = w15 + ∇w15 |
|  | = 0.6 + 0.000316 |
|  | = 0.600316 |
| w24 | = w24 + ∇w24 |
|  | = 0.3 + 0.000707 |
|  | = 0.300707 |
| w25 | = w25 + ∇w25 |
|  | = 1.1 + 0.000362 |
|  | = 1.100362 |
| w34 | = w34 + ∇w34 |
|  | = -1 + 0.000795 |
|  | = -0.999205 |
| w35 | = w35 + ∇w35 |
|  | = 0.1 + 0.000407 |
|  | = 0.100407 |
| θ4 | = θ4 + ∇θ4 |
|  | = 0.2 + (-0.000884) |
|  | = 0.199116 |
| θ5 | = θ5 + ∇θ5 |
|  | = 0.3 + (-0.000452) |
|  | = 0.299548 |
| θ6 | = θ6 + ∇θ6 |
|  | = 0.4 + 0.00343 |
|  | = 0.40343 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **θ3** | **θ4** | **θ5** |
| **0.500619** | **0.600316** | **0.300707** | **1.100362** | **-0.999205** | **0.100407** | **0.199116** | **0.299548** | **0.40343** |

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