**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 | 0,1 | -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 - ~~0~~~~4~~) |
|  | = 1 / [1+e-((0.7 x 0.5 )+ (0.8 x 0.3) + (0.9 x - 1) - 0.2)] |
|  | = 0.770 |
| Y5 | = sigmoid (x1 w15 + x2 w25 +x3 w35 - ~~0~~~~5~~) |
|  | = 1 / [1+e-((0.7x0.6) + (0.8x1.1) + (0.9+0.1) - 0.3)] |
|  | = 0.438 |
| Y6 | = sigmoid (y4 w46+y5 w56- ~~0~~~~6~~) |
|  | = 1 / [1+e-((0.770x-1.1) + (0.438x-0.7) - 0.4))] |
|  | = -0,465 |
| e | = y d,6 - y6 |
|  | = 0 - 0.465 |
|  | = -0,465 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| **0,770** | **0,438** | **0,465** | **-0,465** |

**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** |
|  | = 0,533 x (1-0,553) x -0,553 |
|  | = -0,1366 |
| ∇46 | = **α** x **y4** x **δ6** |
|  | = 0,1 x 0,770 x (-0,1366) |
|  | = -0,0062 |
| ∇56 | = **α** x **y5** x **δ6** |
|  | = 0,1 x 0,438 x (-0,1366) |
|  | = -0,0060 |
| ∇θ6 | = **α** x **(-1)** x **δ6** |
|  | = 0,1 x (-1) x (-0,1366) |
|  | = 0,0137 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| **-0,1156** | **-0,0089** | **-0,0051** | **0,0116** |

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

|  |  |
| --- | --- |
| δ4 | = **y4(1-y4)** x **δ6** x **w46** |
|  | = 0,770(1-0,770) x (-0,1366)(-1,1) |
|  | = 0,0372 |
| δ5 | = **y5(1-y5) x δ6 x w56** |
|  | = 0,438(1-0,438) x (-0,1366)(-0,7) |
|  | = 0,0235 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| **0,0225** | **0,0199** |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | = **α** x **x1** x **δ4** |
|  | = 0,1 x 0,7 x 0,0225 |
|  | = 0,0016 |
| ∇w24 | = **α** x **x2** x **δ4** |
|  | = 0,1 x 0,8 x 0,0225 |
|  | = 0,0018 |
| ∇w34 | = **α** x **x3** x **δ4** |
|  | = 0,1 x 0,9 x 0,0225 |
|  | = 0,0020 |
| ∇θ4 | = **α** x **(-1)** x **δ4** |
|  | = 0,1 x (-1) x 0,0225 |
|  | = -0,0023 |
| ∇w15 | = **α** x **x1** x **δ5** |
|  | = 0,1 x 0,7 x 0,0199 |
|  | = 0,0014 |
| ∇w25 | = **α** x **x2** x **δ5** |
|  | = 0,1 x 0,8 x 0,0199 |
|  | = 0,0016 |
| ∇w35 | = **α** x **x3** x **δ5** |
|  | = 0,1 x 0,9 x 0,0199 |
|  | = 0,0018 |
| ∇θ5 | = **α** x **(-1)** x **δ5** |
|  | = 0,1 x (-1) x 0,0199 |
|  | = -0,0020 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| **0,0016** | **0,0018** | **0,0020** | **-0,0023** | **0,0014** | **0,0016** | **0,0018** | **-0,0020** |

**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 + 0.0016 |
|  | = 0.5016 |
| w15 | = w15 + ∆w15 |
|  | = 0.6 + 0.0014 |
|  | = 0.6014 |
| w24 | = w24 +∆w24 |
|  | = 0.3 + 0.0018 |
|  | = 0.3018 |
| w25 | = w25 + ∆w24 |
|  | = 1.1 + 0.0018 |
|  | = 1.1016 |
| w34 | = w34 + ∆w34 |
|  | = -1 + 0.0020 |
|  | = -0.9980 |
| w35 | = w35 + ∆w35 |
|  | = 0.1 + 0.0018 |
|  | = 0.1018 |
| θ4 | = θ4 + ∆θ4 |
|  | = 0.2 + -0.0023 |
|  | = 0.1977 |
| θ5 | = θ5 + ∆θ5 |
|  | = 0.3 + -0.0020 |
|  | = 0.2980 |
| θ6 | = θ6 + ∆θ6 |
|  | = 0.4 + 0.0116 |
|  | = 0.4116 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **Θ4** | **Θ5** | **Θ6** |
| **0,5016** | **0,6014** | **0,3018** | **1,1016** | **-0,9980** | **0,1018** | **0,1977** | **0,2980** | **0,4116** |

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