

```

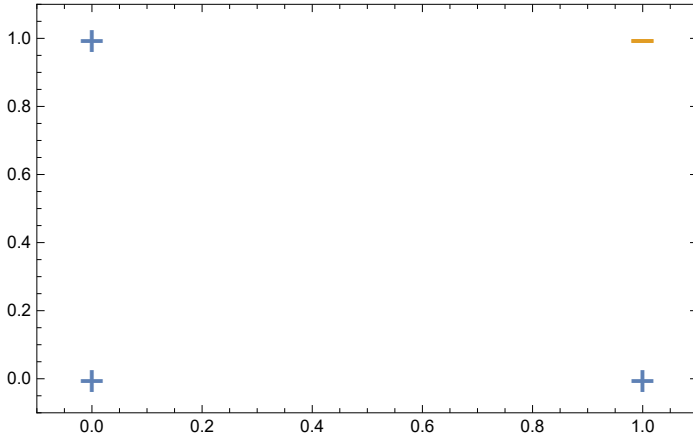
examples = {{0, 0}, {0, 1}, {1, 0}, {1, 1}}; labels = {1, 1, 1, 0}; alpha = 0.5;
positives = {}; For[k = 1, k ≤ Length[examples], k++,
  If[labels[[k]] == 1, positives = Append[positives, examples[[k]]]];
negatives = Complement[examples, positives];

```

```

ListPlot[{positives, negatives}, PlotRange → {{-0.1, 1.1}, {-0.1, 1.1}},
  PlotMarkers → {"+", Large}, {"-", Large}}, Frame → True]

```



```

f[x_] := If[w[[1]] * x[[1]] + w[[2]] * x[[2]] + w[[3]] * 1 > 0, 1, 0]

```

```

error[k_] := Module[{}, labels[[k]] - f[examples[[k]]] ]

```

```

dw[i_, k_] := Module[{}, alpha * error[k] * examples[[k]][[i]]]

```

```

w = {0, 0, 0};

```

```

f[{0, 1}]

```

```

0

```

```

Table[f[examples[[k]]], {k, 1, 4}]

```

```

{0, 0, 0, 0}

```

```

labels

```

```

{1, 1, 1, 0}

```

```

Table[error[k], {k, 1, 4}]

```

```

{1, 1, 1, 0}

```

```

Table[dw[i, k], {i, 1, 2}, {k, 1, 4}]

```

```

{{0., 0., 1., 0.}, {0., 1., 0., 0.}}

```

```

nextW[k_] :=

```

```

Module[{}, {w[[1]] + dw[1, k], w[[2]] + dw[2, k], w[[3]] + alpha * error[k] * 1}]

```

```

nextW[3]

```

```

{1., 0., 1.}

```

w

```
{0, 0, 0}
```

```
train[epochs_] := Module[{count},
  For[count = 0, count < epochs, count++,
    w = nextW[1];
    w = nextW[2];
    w = nextW[3];
    w = nextW[4]; w ]
```

```
train[1000]
```

```
{-1., -0.5, 1.5}
```

```
Table[error[k], {k, 1, 4}]
```

```
{0, 0, 0, 0}
```

```
Table[f[examples[[k]]], {k, 1, 4}]
```

```
{1, 1, 1, 0}
```

w

```
{-1., -0.5, 1.5}
```

```
Show[ListPlot[{positives, negatives}, PlotRange -> {{-0.1, 1.1}, {-0.1, 1.1}},
  PlotMarkers -> {{"+", Large}, {"-", Large}}, Frame -> True],
  Plot[-(w[[1]]/w[[2]]) * x1 - (w[[3]]/w[[2]]), {x1, 0, 1}]]
```

