LING/CSE472

Section

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Plan for today

- Some basic probability

- XOR

- Ngram toolkit on patas

- Start counting things (Assignment 5)

Probability
Why do probabilities sum to 1?

- Only some probabilities sum to 1 :)

- 1 (or 100%) is the probability of a guaranteed outcome

  - If you toss a coin, you MUST get either Heads or Tails...

    - ...in a valid unverse

    - Therefore, $P(H) + P(T) = 1$

    - ...otherwise there is some nonzero probability your coin never landed!

Probability distributions over vocabularies

- Consider a dataset:

  - { I have a cat; I have a dog; I have a cat and a dog } $= D$

    - 15 word tokens, 6 word types

  - V = {I: 3 ; have: 3 ; a: 4 ; cat: 2 ; dog: 2 ; and: 1 }
    $i = 0$ 1 2 3 4 5

- What's P("cat")?

  - Probability of encountering the word "cat" in this sort of data

  - Why is it important that P(w_i) sum up to 1?

  - (Or is it?)

  - Want to leave some probability to UNKnown words, too!

$$P(cat) = \frac{Count(cat)}{size\ of\ D}$$

$$= \frac{2}{15}$$

$$\sum_{i=0}^{N} P(w_i) = 1$$

XOR

	x_1	x_2
0	1	1
1	0	1
0	0	0
1	1	0

$0 = False$

$1 = True$

$(convention)$

- x1=1, x2=1

$h1: 1 \cdot 1 + 1 \cdot 1 + 0 = 2$

$h2: 1 \cdot 1 + 1 \cdot 1 - 1 = 1$

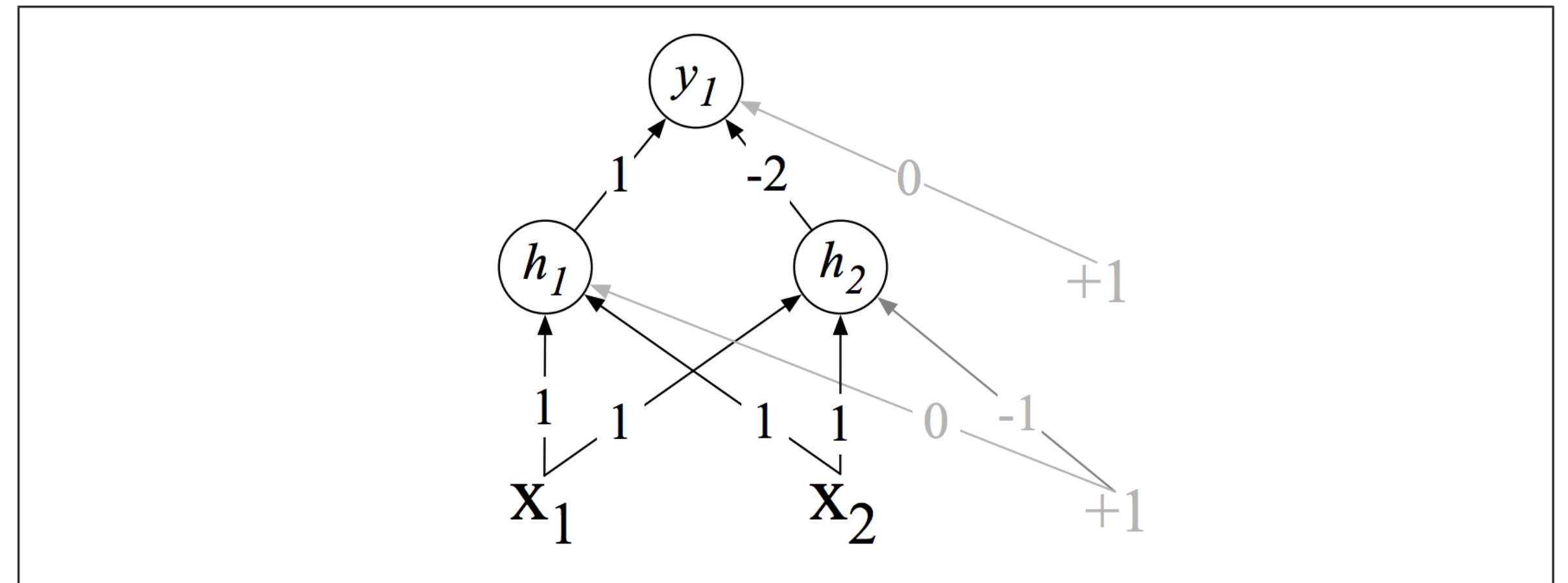$y1: 2 \cdot 1 + 1(-2) = 0 \checkmark$

Figure 7.6 XOR solution after Goodfellow et al. (2016). There are three ReLU units, in two layers; we've called them h_1, h_2 (h for "hidden layer") and y_1. As before, the numbers on the arrows represent the weights w for each unit, and we represent the bias b as a weight on a unit clamped to +1, with the bias weights/units in gray.

XOR

- x1=0, x2=0

$h1: 0 \cdot 1 + 0 \cdot 1 + 0 = 0$

RELU!

$h2: 0 \cdot 1 + 0 \cdot 1 - 1 = -1 \rightarrow 0$

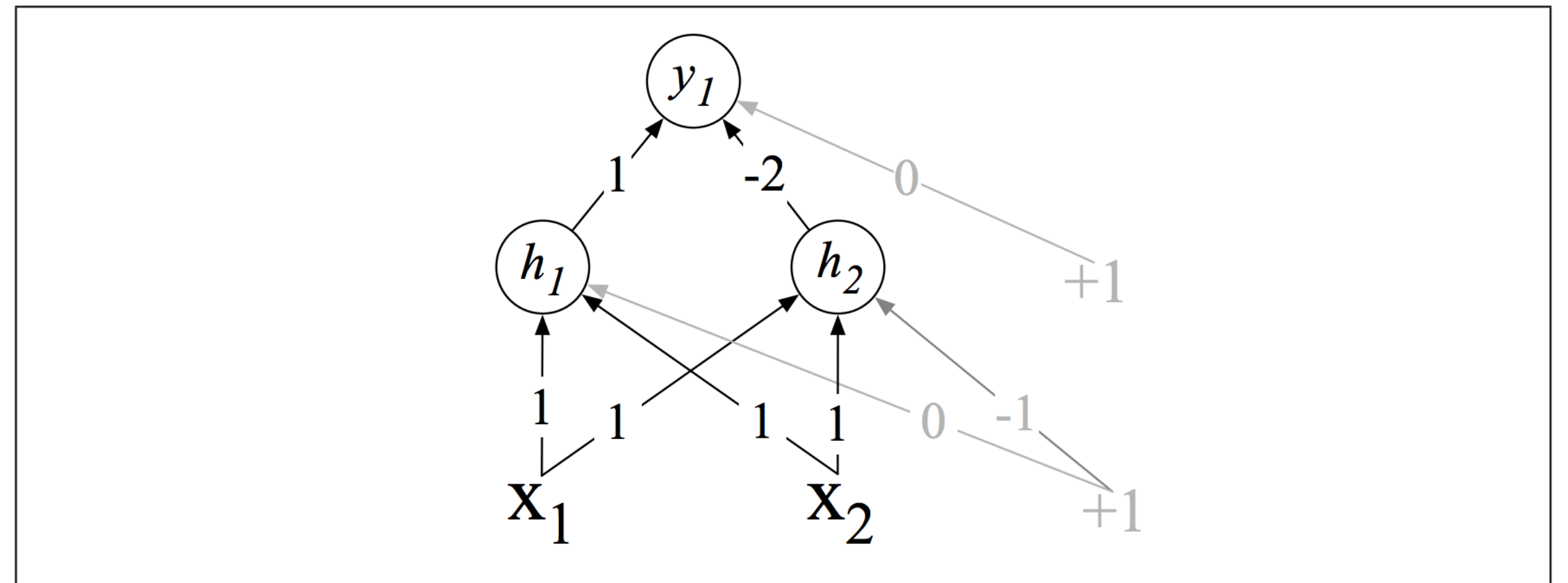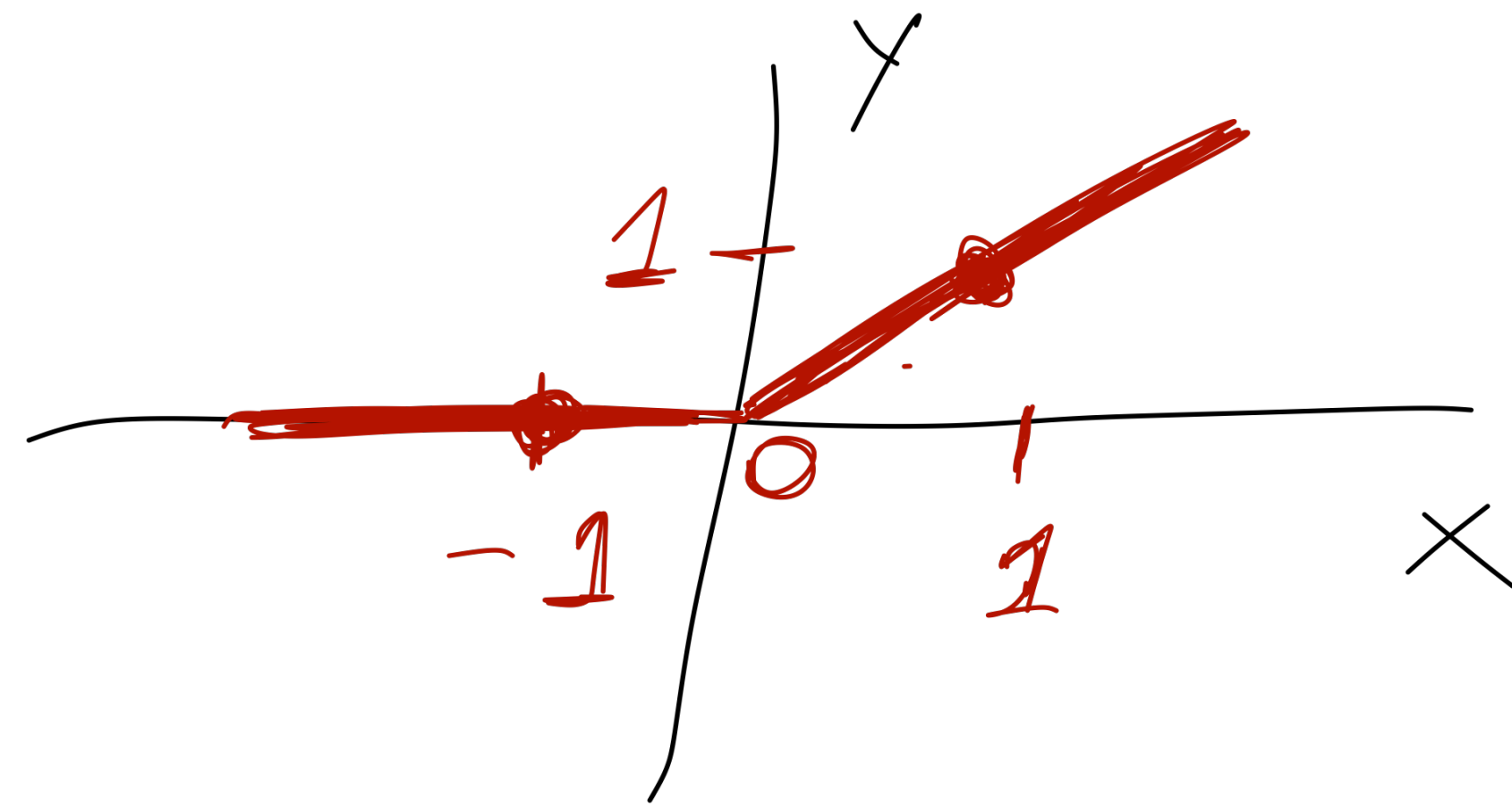$y1: 0 \cdot 1 + 0 \cdot -2 + 0 = 0$

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XOR

- x1=1, x2=0

$$h_1 : 1 \cdot 1 + 0 \cdot 1 + 0 = 1$$

$$h_2 : 1 \cdot 1 + 0 \cdot 1 - 1 = 0$$

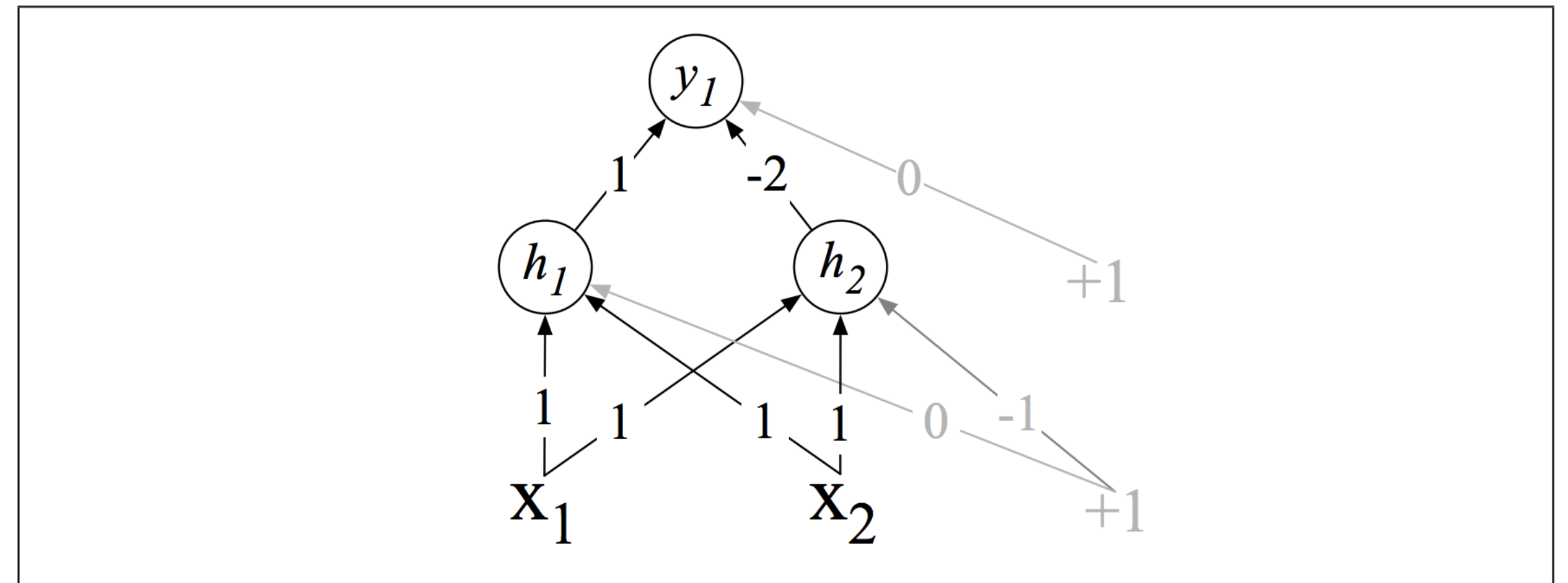$$y_1 : 1 \cdot 1 + 0 \cdot (-2) + 0$$

$$= 1 \checkmark$$

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N-gram toolkit on patas
Assignment 4

- Adding something to your Path on paths

  - Path is an environmental variable

  - If you type a program name in your terminal, the program will run so long as its true location is on your Path

  - Adding something to Path is a way to avoid always having to navigate to each program

  - .bashrc is a hidden file (but that should not matter much on patas)

    - . (dot) is part of its name

    - It must be in your ~ (home directory), so, ~/.bashrc