

Naive Bayes

Bayes' theorem

Steve is very shy and withdrawn, invariably helpful but with very little interest in people or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail.



Librarian

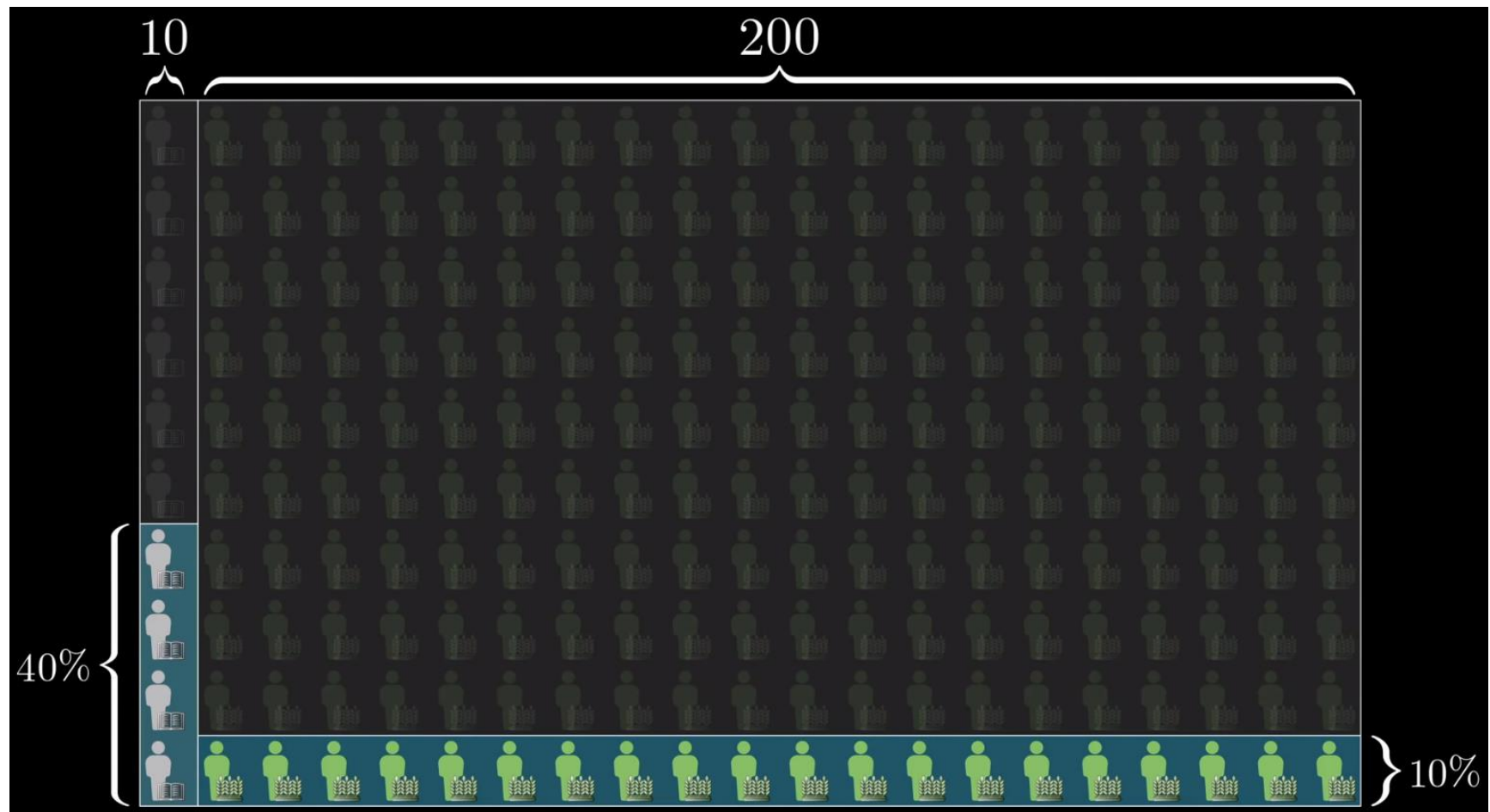


Farmer

50%

50%

Bayes' theorem



Bayes' theorem

Bayes' theorem

$$P(H|E) = \frac{P(H)P(E|H)}{P(E)} = \frac{\cancel{(\# \text{ people})} P(H)P(E|H)}{\cancel{(\# \text{ people})} P(H)P(E|H) + \cancel{(\# \text{ people})} P(\neg H)P(E|\neg H)}$$



“Prior” $\rightarrow P(H) = 1/21$

“Likelihood”

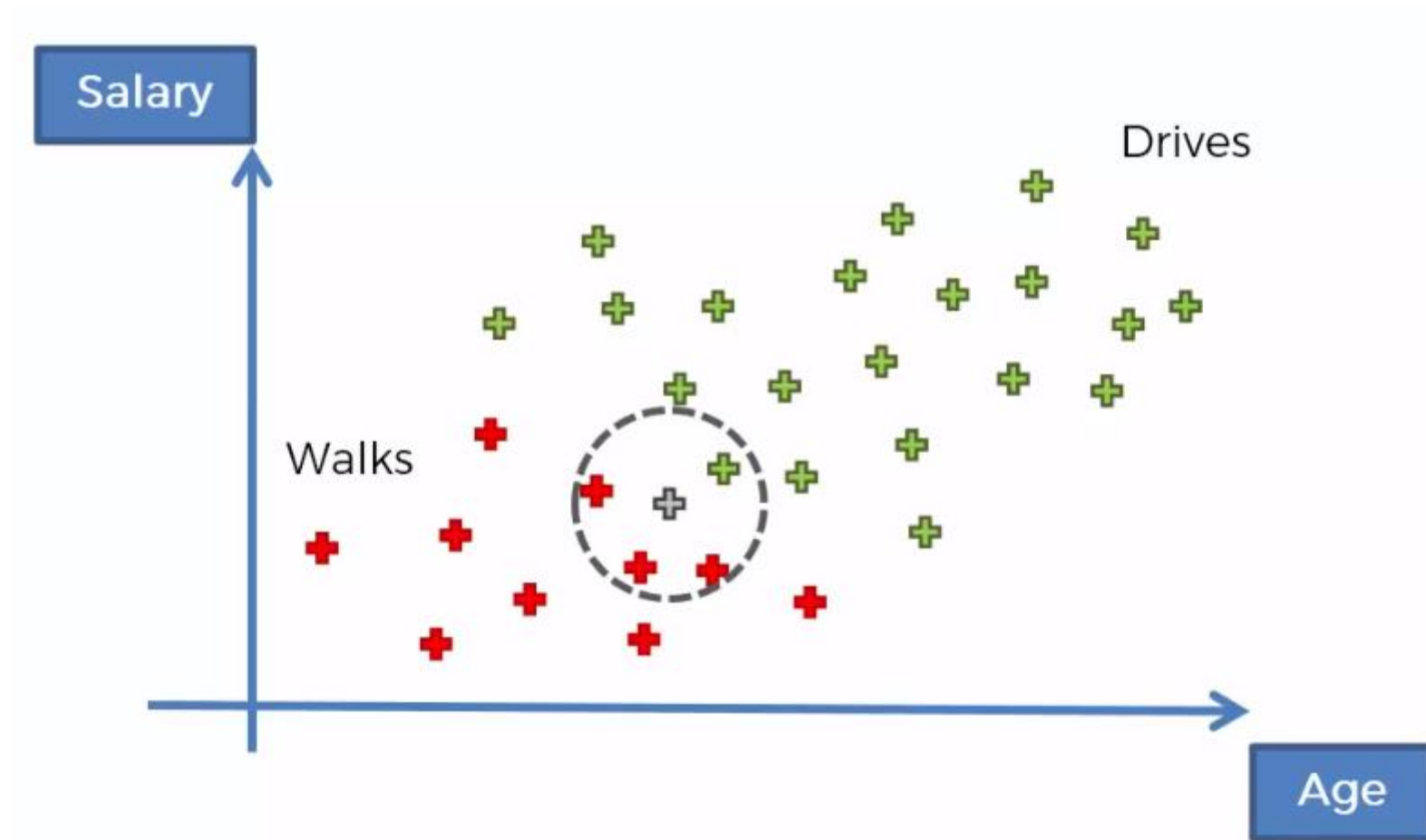


$$P(E|H) = 0.4$$



$$P(E|\neg H) = 0.1$$

Naive Bayes algorithm



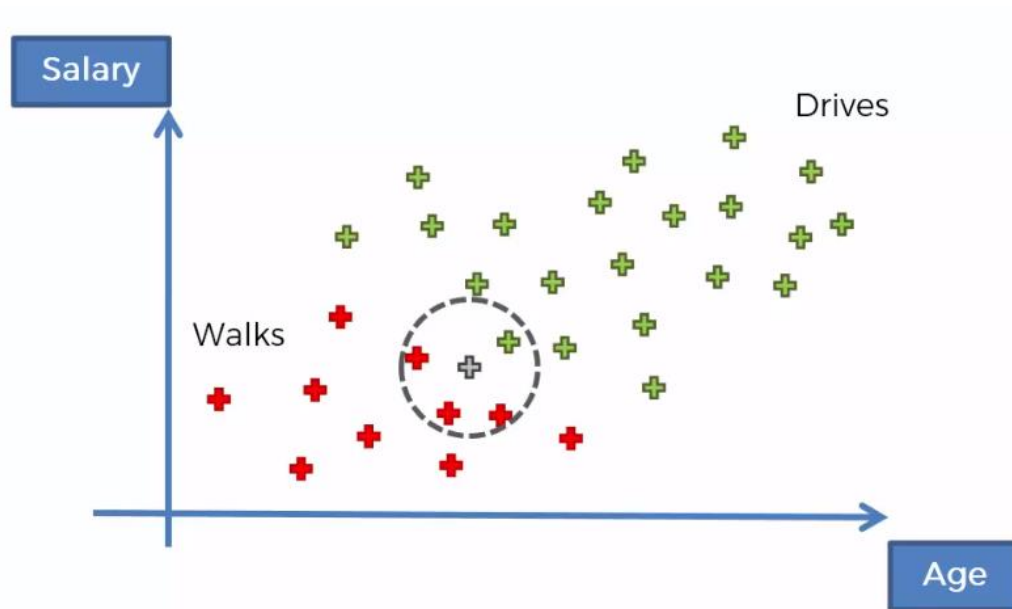
Naive Bayes algorithm

The diagram illustrates the Naive Bayes algorithm formula, $P(Walks|X) = \frac{P(X|Walks) * P(Walks)}{P(X)}$, with components labeled in blue boxes:

- #4** Posterior Probability (points to the left side of the equation)
- #3** Likelihood (points to $P(X|Walks)$)
- #1** Prior Probability (points to $P(Walks)$)
- #2** Marginal Likelihood (points to $P(X)$)

$$P(Walks|X) = \frac{P(X|Walks) * P(Walks)}{P(X)}$$

Naive Bayes algorithm



#4 Posterior Probability

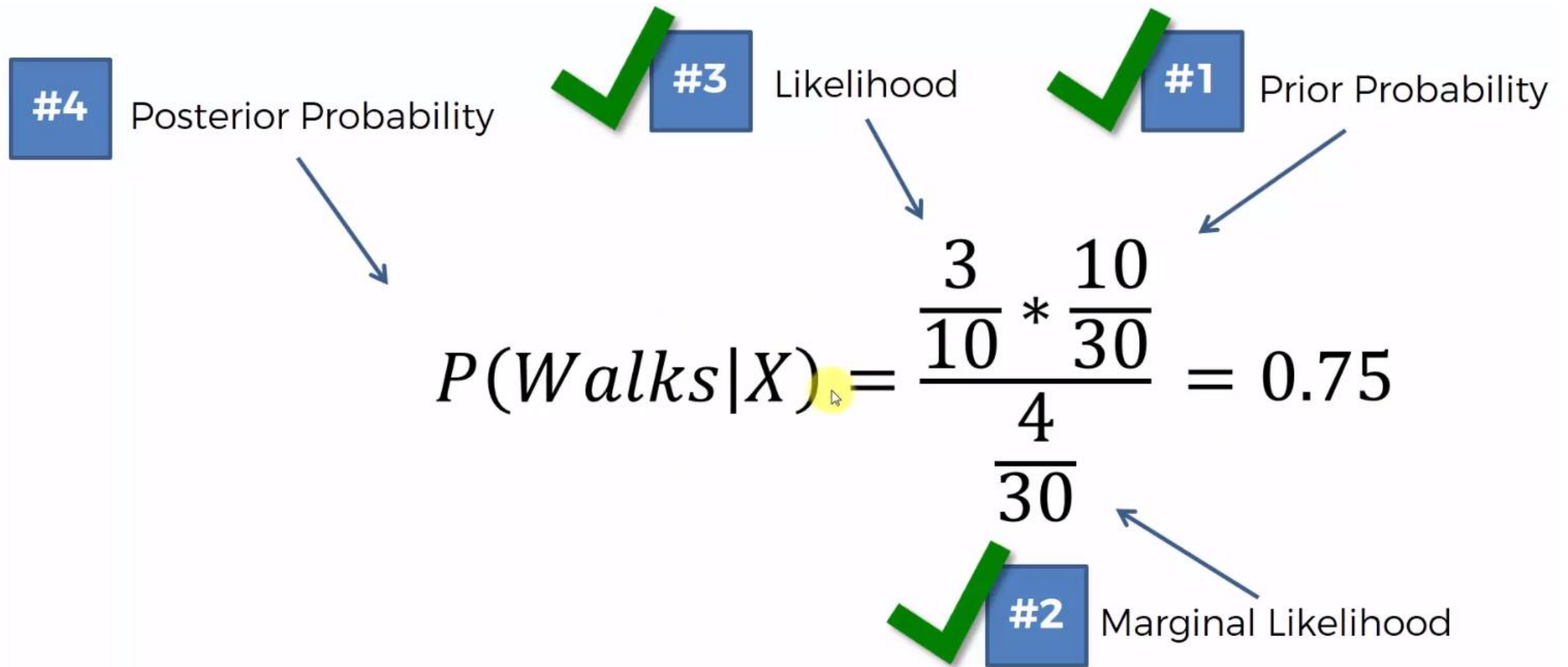
#3 Likelihood

#1 Prior Probability

#2 Marginal Likelihood

$$P(Walks|X) = \frac{P(X|Walks) * P(Walks)}{P(X)}$$

Naive Bayes algorithm



$P(Walks|X)$ v. s. $P(Drives|X)$

$$0.75 > 0.25$$

Additional information

- Why “Naive”
- $P(X)$
- More than 2 classes