$$6 = (A + \bar{B})(\bar{A} + A\bar{B}) + \bar{A}B(A+B) =$$

$$= \cancel{A\bar{A}} + \bar{A}\bar{B} + A\bar{B} + \cancel{A\bar{B}} + \cancel{A\bar{A}B} + \bar{A}B =$$

$$= \bar{B}(A + \bar{A}) + \bar{A}B = \bar{B} + \bar{A}B = \bar{A} + A\bar{B}$$

$B \Rightarrow \bar{A} \equiv \bar{B} + \bar{A}B = B\bar{A}$

$$(B \Rightarrow \bar{A}) = (\bar{B} + \bar{A}) = \bar{B} + \bar{A}B$$

Distrib 2

$$\bar{B} + \bar{A}B = (\bar{B} + \bar{A})(\bar{B} + B) = \bar{B} + \bar{A}$$

A	B	$\bar{B}+\bar{A}$	$\bar{B}+\bar{A}B$
0	0	1	1
0	1	1	1
1	0	1	1
1	1	0	0

TT → T TF → T FT → T FF → T

TT → F TF → F FT → F FF → F

$2 \times 2 \times 2 \times 2 = 16$ funz.

$2^{2^4} = 2^{16}$

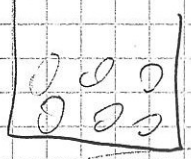
18/02 → Teyres fino desiderata

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10/03/2020

$P(R \cap W \dots W_n \mid B) = h(c \mid N, M, m)$



$\binom{N}{R}\binom{M}{W}\binom{N-M}{\dots}$ $\quad P(R_1 \mid R_2 B) = P$

extracting $h(c \mid N, M, m)$ $\quad N \to \infty$, $M \to \infty$, $\frac{M}{N} = \text{cost} = p$

(red ball)

$h(n) = \binom{m}{n} p^n (1-p)^{m-n}$ $\quad$ binomial $\quad$ 10% $\to p = 0.1$

$P(n \mid m, p)$

N total

C_1 color 1

$C_2 \dots C_K$

B background info

Prob distrib hypergeom distrib

$h(c_i \mid N \dots)$ $\quad c_1$ color 1

c_2 di color 2

$k: \frac{N \to \infty}{c_i \to \infty} \frac{c_i}{N} = \text{cost}$ $\quad h \to$ multinomial distrib.

$m(c_i) = \frac{c!}{\prod c_i!} f_1^{c_1} \dots f_K^{c_K}$ $\quad f$: frequency

$m(c_i \mid f_i)$

Multinomial: likelihood histogram

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Prob Theory — What do we do? Formalize

Observ → hypoth → exp → Falsifying

Not actually no → Circle!

- Observation → Hyp
  ↑ ↓
  Refining hypothesis — more obs — experiments

es → Gravity Aristoteles heavy stuff (water... balls

Galileo → everything falls at the same speed

Newton → everyth $\vec{F} = G\frac{m_1 m_2}{e^2} = m\vec{a}$

(New clear observ - Hypotheses!)

Gravity: explain and predict necessary orbit

Discovery Neptune new class enabled

⇒ new emb: falsifying

D = "observation", fact

H = "hypotheses" I = "background info" context

Bernoulli → IB context: if red no w!

logical proposition defining the problem

$$P(HD|I) = P(H|I)\,P(D|HI) = P(D|I)\,P(H|DI)$$

Product rule : I : object falls

$$\underbrace{P(H|DI)}_{\text{Posterior distr for } H} = P(H|I)\,\frac{P(D|HI)}{P(D|I)} \quad \text{Bayes th}$$

(not of "not distrib") $P(H|I)$ → Prior for H

$P(D|HI)$: likelihood function $P(D|I)$: evidence for data D

Prior : what I know before observ

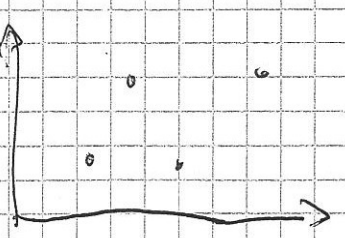
$P(D|HI)$: Likelihood : P Data are true given H, I

Assume Hyp. True, Data ? Predicting value of th

power

$P(D|HI) = 1$ Se teorie perfetta

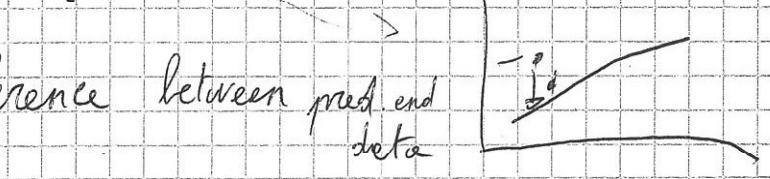
Example



D : set (x_i, y_i) $\forall i$:

H : $y_i = f(x_i)^4$

H_2 : "$y_i = a x_i + b$"



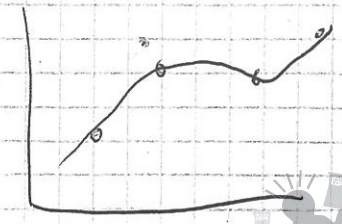
d : difference between pred and data

$\Rightarrow P(D|HI) < 1$

$\mathcal{L}(D, H_1) \sim \mathcal{L}_1$

H_2: "$y_i = \text{poly}(N, x_i)$" → Sampling Theorem N points

=> I can find polynomial passing perfectly



$\mathcal{L}(H_2|D) \sim \mathcal{L}_2 \quad \mathcal{L}_2 > \mathcal{L}_1$

Likelihood not enough ... !

I would conclude H_2 better H_1 ! RØ

But ~~they may exist~~ physical reason : H_2 no, Prior $P(H|I)$

$P(H_2|I) << P(H_1|I)$

~~Bayes Th~~ H: "$y = ax + b$" -> dipende a, b

Set ∞^2 Hyp !

$P(H \triangleright a, b|I) =$ Continuous $P(x)$: "$x \in [\bar{x}, x+dx]$"

$= P(a, b|HI)\, P(a, b|HDI) = \dfrac{P(a, b|HI)\, p(D|a, b\, HI)}{P(D|HI)}$

We have seen norm. !

$$\int_{\Omega} da\, db\; p(a, b|HI)\, p(D|a, b\, HI)$$

Ω : param space

Ω -> guided by What you know about