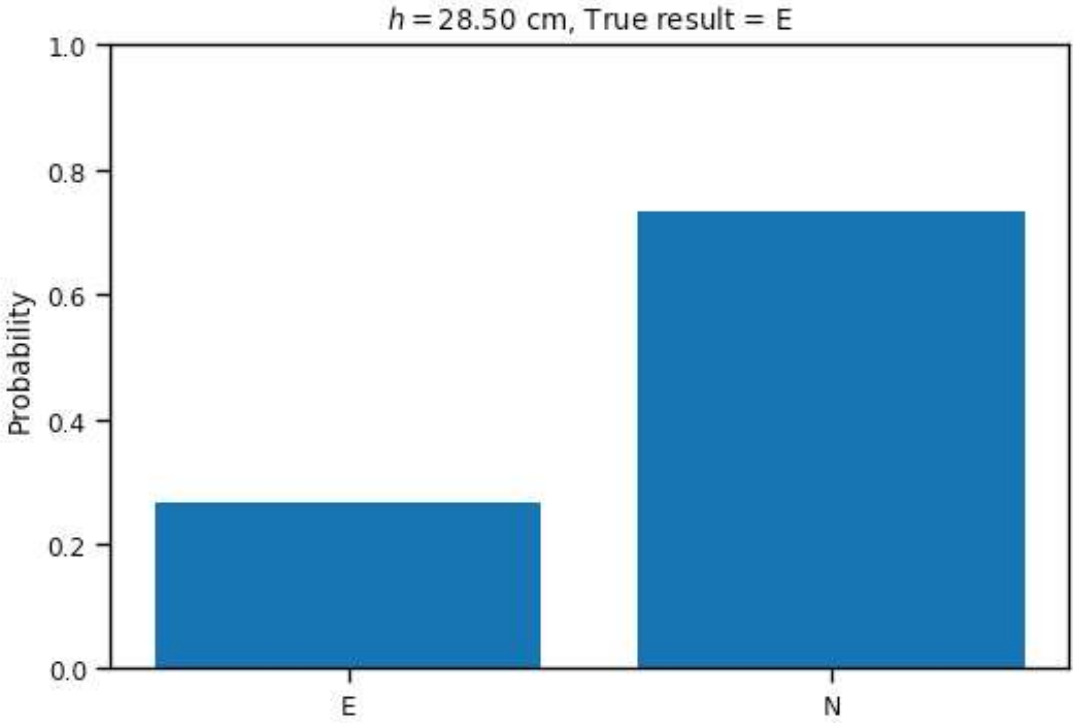
Lecture 16: Classification

Professor Ilias Bilionis

Making decisions

HMX Example



How do you pick a single label?

Picking labels by minimizing the expected cost

$p(y \mid x, w)$

Pick label $\hat{y}$. Cost of choice $c(\hat{y}, y)$.

	True E	True N
Predict E	0	1
Predict N	100	0

$$\min_{\hat{y}} \mathbb{E}[c(\hat{y}, y) \mid x_{1:N}, y_{1:N}]$$

$$= \min_{\hat{y}} \int c(\hat{y}, y)\, p(y \mid x, x_{1:N}, y_{1:N})\, dy$$

$$\simeq \min_{\hat{y}} \int c(\hat{y}, y)\, p(y \mid x, w)\, dy$$

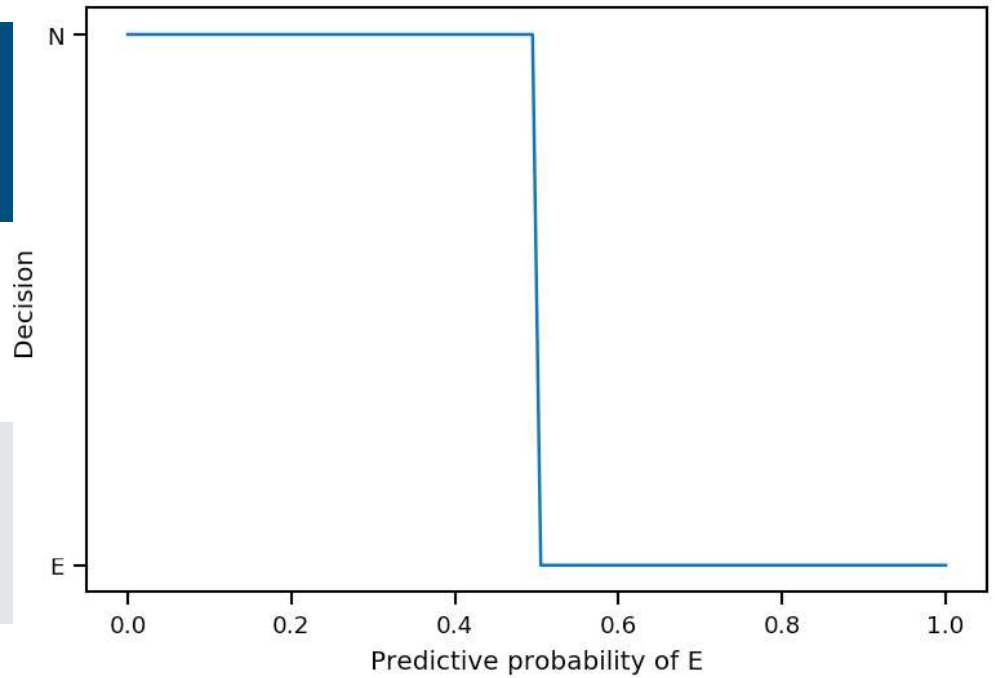
Best decision when risk-neutral.

When risk-averse you need utility theory.

Jitesh Pandhal Decision Making.

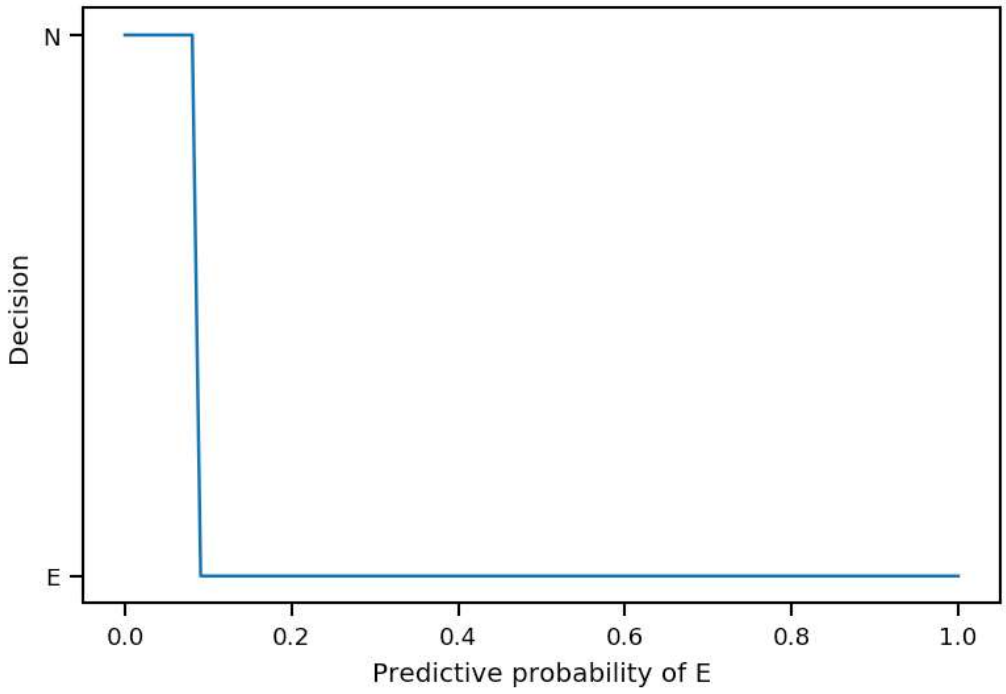
The cost of making wrong predictions

	True result E	True result N
Predict E	0	1
Predict N	1	0



The cost of making wrong predictions

	True result E	True result N
Predict E	0	1
Predict N	10	0



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