

Let $P(i) := \text{prob. user reads doc } i$

$R(\vec{r}) := \text{fraction of docs user reads}$
from \vec{r} which are relevant

Then $\text{gain}(\vec{r}) := \mathbb{E}_P[R(\vec{r})]$

$$= \sum_{i=1}^{|\vec{r}|} P(i) \cdot r_i$$