Rank Metric Combination

Saturday, March 30, 2024 10:14 AM

Rank metric from multi-objective model needs to be combined

Weighted Average:

$$p_{click} + w_1 \cdot p_{like} + w_2 \cdot p_{collect} + \cdots$$

"Another" Average:

$$p_{click}\left(1 + w_1 p_{like} + w_2 p_{collect} + \cdots\right)$$

p_{click}: $\frac{click}{exposure}$ × p_{like}: $\frac{like}{click}$ = $\frac{like}{exposure}$

Tick Tock Model:

estimated user watch time

$$\left(1 + w_1 p_{time}\right)^{\alpha_1} \cdot \left(1 + w_2 p_{like}\right)^{\alpha_2} \cdots$$

快手:

① p_{time} → rank n videos

② ranking result: r_{time} → $\frac{1}{r_{time}^{\alpha} + \beta}$

③ repeat ①② for "like", "click" etc.

④ final score:

$$\frac{w_1}{r_{time}^{\alpha_1} + \beta_1} + \frac{w_2}{r_{click}^{\alpha_2} + \beta_2} + \frac{w_3}{r_{like}^{\alpha_3} + \beta_3} + \cdots$$

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E-commerce:

① exposure → click → add cart → purchase

② model estimates P_{click} . P_{cart} P_{pay}

③ final score:

$$P_{click}^{\alpha_1} \cdot P_{cart}^{\alpha_2} \cdot P_{pay}^{\alpha_3} \cdot price^{\alpha_4}$$

if $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$. it's expected revenue.