CS-4053 Recommender System

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Lecture 12: Evaluation Metrics for Recommender Systems

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Evaluation Measures

- **P@*k*** (Precision@*k*)
  - *Of the top **k** relevant items that were recommended, the no. of items that are actually relevant to the user*
- **AP@*k*** (Average Precision@*k*)
  - *For a single user, the mean of **Precision@i** for **i**=1, 2, 3, …, k*
- **MAP@*k*** (Mean Average Precision@*k*)
  - *The mean of **AP@k** over all users*

Evaluation Measures: Formulae

- **Precision**

$$P = \frac{True\ Positive}{True\ Positive + False\ Positive}$$

- **Precision@k**

$$P@k = \frac{True\ Positive\ in\ subset\ k}{True\ Positive\ in\ subset\ k + False\ Positive\ in\ subset\ k}$$

- **Average Precision@*k***

$$AP@k = \frac{1}{m}\sum_{k=1}^{n} P@k\ if\ k^{th}\ item\ is\ relevant$$

Where m is no. of possible relevant items in system and n is no. of items considered

- **Mean Average Precision**

$$MAP = \frac{\sum_{k=1}^{K} AP@k}{K}$$

Evaluation Measures: Intuitive

- **Precision**

$$P = \frac{\#\ of\ items\ recommended\ that\ are\ relevant}{\#\ of\ all\ items\ that\ can\ possibly\ be\ relevant}$$

- **Precision@k**

$$P@k = \frac{\#\ of\ items\ recommended\ that\ are\ relevant}{\#\ of\ items\ that\ were\ recommended\ i.e.,k}$$

- **Average Precision@*k***

$$AP@k = \frac{1}{\#\ of\ all\ possible\ relevant\ items}\ (P@1\ if\ 1^{st}\ items\ is\ relevant + P@2\ if\ 2^{nd}\ item\ is\ relevant + \cdots + P@k\ if\ k^{th}\ item\ is\ relevant)$$

- **Mean Average Precision**

$$MAP = \frac{Sum\ of\ AP@k\ for\ k = 1, 2, \ldots, upto\ K\ items\ that\ are\ recommended}{K}$$