**Your Name: Chih-Wei Chang**

**Your Andrew ID: cchang3**

# Homework 5

## Collaboration and Originality

1. Did you receive help <u>of any kind</u> from anyone in developing your software for this assignment (Yes or No)? It is not necessary to describe discussions with the instructor or TAs.

   If you answered Yes, provide the name(s) of anyone who provided help, and describe the type of help that you received.

2. Did you give help <u>of any kind</u> to anyone in developing their software for this assignment (Yes or No)?

   If you answered Yes, provide the name(s) of anyone that you helped, and describe the type of help that you provided.

3. Are you the author of <u>every line</u> of source code submitted for this assignment (Yes or No)? It is not necessary to mention software provided by the instructor.

   If you answered No:
   a. identify the software that you did not write,
   b. explain where it came from, and
   c. explain why you used it.

4. Are you the author of <u>every word</u> of your report (Yes or No)?

   If you answered No:
   a. identify the text that you did not write,
   b. explain where it came from, and
   c. explain why you used it.

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# Homework 5

**Instructions**

## 1    Experiment:  Diversity baselines

### 1.1    Experimental results

|  | Indri | Indri + PM2 | Indri + xQuAD | BM25 | BM25+ PM2 | BM25+ xQuAD |
|---|---|---|---|---|---|---|
| **P-IA@10** | 0.153000 | 0.353000 | 0.194500 | 0.135833 | 0.352667 | 0.319167 |
| **P-IA@20** | 0.185583 | 0.304417 | 0.241333 | 0.152500 | 0.305333 | 0.293417 |
| **αNDCG@20** | 0.368240 | 0.513797 | 0.387914 | 0.396076 | 0.581289 | 0.538643 |

### 1.2    Parameters

For Indri, we set mu=2500, lambda=0.4; for BM25, we set k_1=1.2, b=0.75, and k_3=0.0. For all diversification algorithm, we set the maxInputRankingsLength to 100, maxResultRankingLength to 50, and lambda to 0.5.

### 1.3    Discussion

## 2    Experiment: The effect of diversification on relevance

### 2.1   Experimental results

|  | Indri | Indri + PM2 | Indri + xQuAD | BM25 | BM25+ PM2 | BM25+ xQuAD |
|---|---|---|---|---|---|---|
| **P@10** | 0.2600 | 0.5000 | 0.3100 | 0.2200 | 0.5300 | 0.4600 |
| **P@20** | 0.3000 | 0.4650 | 0.3650 | 0.2650 | 0.4900 | 0.4750 |
| **P@30** | 0.2667 | 0.4300 | 0.3433 | 0.2700 | 0.4433 | 0.4133 |
| **MAP** | 0.1499 | 0.1841 | 0.1197 | 0.1319 | 0.1629 | 0.1516 |

### 2.2   Discussion

*Analyze the experimental results.*

## 3    Experiment: Effect of $\lambda$

### 3.1   Experimental results

|  | $\lambda$=0.0 | $\lambda$=0.2 | $\lambda$=0.4 | $\lambda$=0.6 | $\lambda$=0.8 | $\lambda$=1.0 |
|---|---|---|---|---|---|---|
| **Indri + PM2** | | | | | | |
| **P-IA@10** | 0.328667 | 0.348833 | 0.358000 | 0.353000 | 0.355833 | 0.292167 |
| **P-IA@20** | 0.288167 | 0.295250 | 0.302750 | 0.311250 | 0.307917 | 0.277250 |
| **αNDCG@20** | 0.504577 | 0.527529 | 0.526524 | 0.513794 | 0.495983 | 0.508505 |
| **Indri + xQuAD** | | | | | | |
| **P-IA@10** | 0.153000 | 0.163000 | 0.164500 | 0.214500 | 0.294500 | 0.361500 |
| **P-IA@20** | 0.185583 | 0.190083 | 0.208833 | 0.251333 | 0.274833 | 0.313667 |
| **αNDCG@20** | 0.368240 | 0.380079 | 0.380228 | 0.389942 | 0.423560 | 0.534654 |

|  | $\lambda$=0.0 | $\lambda$=0.2 | $\lambda$=0.4 | $\lambda$=0.6 | $\lambda$=0.8 | $\lambda$=1.0 |
|---|---|---|---|---|---|---|
| **BM25 + PM2** | | | | | | |
| **P-IA@10** | 0.349167 | 0.339833 | 0.341000 | 0.368500 | 0.357333 | 0.326167 |
| **P-IA@20** | 0.299667 | 0.312750 | 0.315333 | 0.296833 | 0.303083 | 0.295333 |
| **αNDCG@20** | 0.548394 | 0.583820 | 0.574348 | 0.541070 | 0.648361 | 0.575574 |
| **BM25 + xQuAD** | | | | | | |
| **P-IA@10** | 0.135833 | 0.282500 | 0.324167 | 0.332667 | 0.340167 | 0.344333 |
| **P-IA@20** | 0.152500 | 0.253833 | 0.293167 | 0.292417 | 0.306167 | 0.311167 |
| **αNDCG@20** | 0.396076 | 0.521226 | 0.537857 | 0.532311 | 0.564793 | 0.570836 |

### 3.2   Discussion

*Analyze the experimental results.*

# 4    Experiment:  The effect of the re-ranking depth

## 4.1    Parameters

Indri's lambda = pm2 0.6, x 1.0. BM25's lambda = 0.8.

## 4.2    Experimental results

|  | 25 / 25 | 50 / 25 | 100 / 25 | 100 / 50 | 200 / 100 |
|---|---|---|---|---|---|
| **Indri + PM2** | | | | | |
| **P-IA@10** | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| **P-IA@20** | | | | | |
| **αNDCG@20** | | | | | |
| **Indri + xQuAD** | | | | | |
| **P-IA@10** | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| **P-IA@20** | | | | | |
| **αNDCG@20** | | | | | |

|  | 25 / 25 | 50 / 25 | 100 / 25 | 100 / 50 | 200 / 100 |
|---|---|---|---|---|---|
| **BM25 + PM2** | | | | | |
| **P-IA@10** | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| **P-IA@20** | | | | | |
| **αNDCG@20** | | | | | |
| **BM25 + xQuAD** | | | | | |
| **P-IA@10** | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| **P-IA@20** | | | | | |
| **αNDCG@20** | | | | | |

## 4.3    Discussion

*Analyze the experimental results.*