Breakdown of paper on Information Retrieval into talks' topics

Topics

1. Sections 1 and 2 of the paper. You may read a somewhat different exposition of ideas behind Information Retrieval in the links on this topic from the textbook by S.J. Leon, found a few lines below this document (right above "Additional/optional materials for midterm project").

2. Section 3 *without* Sec. 3.2.
   In addition, you must dwell on QR decomposition and thoroughly explain the third sentence on p. 343 ("The relation $A = QR$ shows that ...").
   Make sure to first review the topics comprising Eqs. (2)–(7) in the "Background from Linear Algebra" document (found a few lines below on this webpage).
   The excerpt from the textbook by S. Leon on "Notes on Gram–Schmidt orthogonalization and QR factorization," also found below on the webpage, can be somewhat helpful (specifically, you only need Example 2 and Theorem 5.6.2 from there). You can mention that QR decomposition is related to Gram–Schmidt orthogonalization, but you do *not* need to explain the exact relation between them.

3. Section 4.

4. Announce that Section 5 uses an approach alternative to QR decomposition. This approach uses SVD. Therefore, this and next speaker will present basics of SVD.
   Read and present on the posted excerpt on SVD from the textbook by D. Poole, as follows:

   - p. 590 and the first paragraph on p. 591 (up to words "Geometrically, this result..."). You do not need to present Example 7.33.

   - pp. 592–593, where you need to stop at Example 7.34.

   You may also find pp. 3–6 of "my own notes on SVD" (posted below this link) helpful.

5. Continue with the SVD theory from the same excerpt: cover from the last paragraph on p. 595 up to the last paragraph on p. 597. Among the statement of Theorem 7.15, you need to explain in detail (a) and (b). You should also present (d) without proof; you should skip (c) and (e).
   Make sure to thoroughly study the "Background from Linear Algebra" document before studying the above material.

6. Section 5 and the paragraph on p. 351 that begins with "Let us now revisit ...". When covering Sec. 5, make sure to discuss the significance of Eq. (5.1). When covering the paragraph on p. 351, make sure to demonstrate how the specific values of the cosines were obtained.

Some general recommendations and requirements[1]

- Please send me a *ranked* list of about 4 topics that you would feel comfortable presenting. (Of course, I will assign to you only one.) You may send more than 4 topics, but only if you feel like doing it. You may also send fewer than 4, but please keep in mind that my ability to assign to you a topic that you will feel comfortable with will decrease with the number of choices you give me.

  I will decide on the topics for everyone and will notify the class. In case that I need to resolve a potential "conflict" as to which topic to assign to whom, I will use the first-come-first-served rule. So, you should act reasonably quickly, but not so quickly that it would impair your ability to think about your preferred topics.

- The default time for each talk is 20 minutes plus a couple of minutes for questions. However, see the last item below.

- It may be helpful for you to look at the copy of the project paper with my comments, which is posted under the main link to the project paper.

- Announce the main issue to be considered in your part.

- Filter out non-mathematical content, such as names of funding agencies, how many books are in the Library of Congress, etc.. In particular, in the Introduction you need to present only the information that will be required for the understanding of the model and the general setup.

- You are responsible for knowing or refreshing all terminology encountered in this paper that you have covered in the Linear Algebra course. You should also thoroughly study the "Background from Linear Algebra" document posted under this document.

- You must work out all the numerical examples in your part, even if the paper presents them only in general words.

- I may add a couple of minutes to your time limit if I find that your topic requires it.

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[1]These are *in addition* to the Guidelines and Cosmetic suggestions posted on the website.