CSE 515 Multimedia and Web Databases

Phase #1

(Due Oct 28th 2018, midnight)

Description: In this project, you will experiment with

- text and image features,
- vector models, and
- dimensionality reduction

- **Task 1:** Implement a program which lets the user to chose among

  1. a user-term vector space
  2. a image-term vector space, or
  3. a location term vector space,

  and then, given, a positive integer value, k, identifies and reports the top-k latent semantics/topics in the corresponding term space using

  1. PCA,
  2. SVD, or
  3. LDA.

  Each latent semantic should be presented in the form of term-weight pairs, ordered in decreasing order of weights.

- **Task 2:** Extend the above program such that, after the top-k latent semantics are identified, given

  1. a user ID,
  2. an image ID, or
  3. a location ID,

  the system also identifies the most related 5

  - user IDs,
  - image IDs, and
  - location IDs

  using these k latent semantics (list also the matching scores).

- **Task 3:** Implement a program which, given a visual descriptor model (CM, CM3x3, CN, CN3x3,CSD,GLRLM, GLRLM3x3, HOG,LBP, LBP3x3) and value "k",

  - first identifies (and lists) k latent semantics using

1. PCA,
2. SVD, or
3. LDA,

on the corresponding image feature space, then

– given an image ID, identifies the most related 5
  * image IDs and
  * location IDs

using these k latent semantics (list also the matching scores).

As before, the choice of the dimensionality reduction algorithm to be used is left to the user.

- **Task 4** Implement a program which, given a location ID, a visual descriptor model (CM, CM3x3, CN, CN3x3,CSD,GLRLM,GLRLM3x HOG,LBP, LBP3x3), and value k,
  – first identifies (and lists) k latent semantics corresponding to the given location using
    1. PCA,
    2. SVD, or
    3. LDA

    (as before, the choice of the dimensionality reduction algorithm to be used is left to the user), and then
  – identifies and lists the most related 5 locations using these k latent semantics (list also the matching scores).
- **Task 5** Implement a program which, given a location ID and value k,
  – first identifies (and lists) k latent semantics corresponding to the given location using
    1. PCA,
    2. SVD, or
    3. LDA

    applied across all visual descriptor models (as before, the choice of the dimensionality reduction algorithm to be used is left to the user), and then
  – identifies and lists the most related 5 locations using these k latent semantics (list also the matching scores).
- **Task 6** Implement a program which, given a value k,
  – creates a location-location similarity matrix,
  – performs SVD on this location-location similarity matrix, and
  – reports the top-k latent semantics.

  Each latent semantic should be presented in the form of location (name)-weight pairs, ordered in decreasing order of weights.
- **Task 7** Implement a program which, given a value k,
  – creates an user-image-location tensor (based on number of terms shared by all three),
  – performs rank-k CP decomposition of this tensor, and
  – creates k non-overlapping groups of users, images, and locations based on the discovered latent semantics.

You can useMatlab packages for PCA, SVD, LDA, and tensor decomposition.

Deliverables:

- Your code (properly commented) and a README file.
- Your outputs for the provided sample inputs.
- A short report describing your work and the results.

Please place your code in a directory titled “Code”, the outputs to a directory called “Outputs”, and your report in a directory called “Report”; zip or tar all off them together and submit it through the digital dropbox.