Teach 4 - PCA and feature extraction

Purpose

The intent of this teach is to implement an elementary principal component analysis of a two dimensional data, however in this case the data is represented as an image that must be pre-processed and manipulated into a usable form. Your objective is to determine if there are any usable geometric features within the image, and to align the image along the principal direction of the image.

As always you are required to write a report on the results based on the Assignment requirements.

Assignment requirements

You may work in any group you choose. The LaTeX style file is to be the same as for Teach 2-1. Graphics that are not vector graphics will not be accepted. Please make an effort to construct useable graphics that are appropriately scaled for the article, and write carefully.

Follow these instructions.

- Your group must construct the PCA analysis of two data sets, based on the image files balls.jpg and orbit.jpg.
- You must develop a strategy for pre-processing the image data to usable two dimensional digital data set, for example, using thresholding of image values to achieve a cluster of points suitable for PCA.
- Compare and contrast the results obtained and discuss the meaning of the results obtained.
- The writeup PDF file should have a title, along with the names of the authors, to be submitted by email to Joseph.Kolibal@usm.edu with the subject heading, 'COS702 TEACH4', exactly as written. Please do not use the subject header in any other communication as it will be used to automatically filter your submission.
- **Please follow this instruction:** The pdf file itself must be named by the surname of the first author on the title page, .e.g., if the authors are B. Salton, A. Smith, V. Shie, and W. Vishnan, then the pdf file is named `salton-etal.pdf`. If there is only one author, e.g., N. Niobe, then the pdf file is named `niobe.pdf`. This author is the author for all correspondence regarding the publication.