

CS32310: Solid Object Visualisation Case Study

Semester 1, Coursework (Assessed Assignment, 20%)

Date of release: 15th October 2012

Date of submission: 15th November 2012

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Task

Study the MATLAB code in CS32310_ASSIGNMENT-2012 that was used in class demonstrations to illustrate the basic transformations of

1. Parallel projection
2. Perspective Projection
3. Reflect
4. Rotate
5. Scale
6. Shear
7. Shift

With explanations given in the lecture notes.

Write your own visualization routines, and choose your own scene solid objects, to demonstrate these transformations.

Carry out the transformations using (a) vector formulae (b) matrix formulae. Use a fairly complex visualization example to time these two procedures against each other.

Draw your conclusions.

Write up your findings in the form of a report, that follows standard publication procedure. There should be an Abstract, Introduction, Methods, Results and Conclusion sections. (See, for example, "Organization of a scientific paper" in

Instructions to Authors,

<http://www.seg.org/documents/10161/74670/InstructionsToAuthors2012.pdf>

Environment

You may use graphics tools that are available on IS machines or Department of Computer Science lab machines.

Your code is to be demonstrated on one of these machines. It is not acceptable to make it necessary to download special software for the purpose of demonstration.

You may find that the above 6 transformations are already written as part of the standard graphics routines software. In this assignment you are asked to write your own versions of these routines.

Deliverables

The assignment report, written according to the structure of a scientific report.

This should contain

- I. Declaration of originality document
- II. a description of the vector transformation methods,
- III. a description of the matrix transformation methods,
- IV. a description of the structures needed to represent a solid object
- V. the exact form of the data is to be provided (so that I can use my own data files)
- VI. screen captures to show the results of these
- VII. timing comparison results between the vector and matrix methods, using a fairly "large" example to make timing differences evident.
- VIII. ideas on how the assignment could be extended to cover more realistic scene views
- IX. plan of a live demonstration of the assignment software
- X. references
- XI. acknowledgements.

Submission

Work is to be submitted via **Blackboard**. The deadline is 23:59:00 on Thursday 15th November 2012. This deadline falls into the "Work Week".

Assessment

I shall be looking for the following elements in the **report**: (70%)

- A. description of the vector methods
- B. description of the matrix methods

- C. description of the data structures needed to represent solid objects
- D. timing comparisons of the vector and matrix methods
- E. quality of the written presentation

I shall be looking for the following elements regarding the **code (15%)**

- a) Readability
- b) Extent to which it addresses the task
- c) Explicit instructions of how to run your programs
- d) **Ability to obtain scene data from a file, with adequate navigation tools** (so that I can run my own data files)

Demonstration (15%)

You will be asked to give a demonstration of your work. During this time, any questions arising out of the report, the code and the demo may be put to you.

The course MATLAB code is to be found in file