Assignment 5
Due Thursday, June 22 @ 18:00

Description

In the last lecture, we talked about how to use matrices to represent state transitions. In this assignment, you will work through a simple example.

Task

Consider a mobile phone with 3 volume settings: Vibrate, Soft & Loud. The mobile phone has two buttons that loop
through each volume settings, in either direction. It also has 3 buttons that jump to each sound setting directly.

1. Draw a state diagram of the mobile's volume settings. Label all connections
appropriately.

2. State transitions can be represented by the matrix formula s' = sB. What is the s
for each of the three volume settings?

3. Write the matrix B for each of the six buttons (V_UP, V_DOWN, V_V, V_S, V_L)

4. Show, with matrix algebra, that V_UP is the undo for V_DOWN.

5. Is it possible to "undo" the state transition from pressing the 0, 1 and 2 buttons. Write
the matrices or prove that they do not exist.

Extra Credit: Suppose we wanted to examine the clock on the mobile phone (each digit has
its own button, in one of the submenus). We could examine the button that only handles the ones
of hours setting by reducing the numbers of states. Show how this technique is possible and
discuss its implications.

Submission.

Please submit a PDF copy of your assignment to holman@cs.rwth-aachen.de before the
due date. The subject should be "ct assignment 5". In the email, list the name of your group
members (you may work in groups of two). Finally, list the names of the members in the PDF
file (e.g. ct06-a5-lastname-lastname.pdf).

Grading

The assignment will be graded on the following rough scale:

   * 1.0 - exceptional work that clearly went above and beyond what was expected from the exercise
   * 2.0 - exercise was completed satisfactorily as per the assignment specification
   * 3.0 - exercise was completed, but has some problems
   * 4.0 - incomplete exercise
   * 5.0 - little or no effort was put into the exercise

Late assignments will be graded with a penalty of 0.5 per 24 hour period after the due date.