Assignment 4 - Question 1

due Friday, February 26, 2021

(exercise 14 from chap 11 of Er)

You’re organizing the First Annual CSGSBS* Dance, to be held all day Friday, Saturday, and Sunday. Several 30-minute sets of music will be played during the event, and a large number of DJs have applied to perform. You need to hire DJs according to the following constraints:

- Exactly $k$ sets of music must be played each day, and thus $3k$ sets altogether.
- Each set must be played by a single DJ in a consistent music genre (ambient, bubblegum, dubstep, horrorcore, K-pop, etc.)
- Each genre must be played at most once per day.
- Each candidate DJ has given you a list of genres they are willing to play.
- Each DJ can play at most three sets during the entire event.

Suppose there are $n$ candidate DJs and $g$ different musical genres available. Describe and analyze an efficient algorithm that either assigns a DJ and a genre to each of the $3k$ sets, or correctly reports that no such assignment is possible.

(*) Computer Science Graduate Student Benevolent Society