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'''
Lab 2

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CIS 41B

Enroll Data Class: Reads in csv file and plots 2 graphs. One graph is the
enrollment trend by year
                    and the other is enrollment by age groups. Implements
numpy and pyplot.
'''

import csv
import numpy as np
import matplotlib.pyplot as plt

class EnrollData:
    # Constructs EnrollData object and initializes to numpy arrays
    def __init__(self, file):
        self.file = file
        self.dataArrInt = np.array([])
        self.yearArrInt = np.array([])

    # Decorator that prints return array of numbers from function
    def showNums(f):
        def wrapper(*args, **kwargs):
            result = f(*args, **kwargs)
            print(result)
            return result
        return wrapper

    # Reads file and stores first row into years array and the populates
the data into the array
    def readFile(self):
        with open(self.file) as fin:
            reader = csv.reader(fin)
            years = next(reader)
            years_arr = np.array(years)
            self.yearArrInt = years_arr.astype(int)

            data_list = [row for row in reader]
            dataArr = np.array(data_list)
            self.dataArrInt = dataArr.astype(int)

    # Sums up data array for the total of students and creates a plot
graph
    @showNums
    def plotEnrollTrend(self):
        totalStudents = self.dataArrInt.sum(0)
        plt.plot(self.yearArrInt, totalStudents/1000000, "--*g")
        plt.title("Total Enrollment (2014-2017)")
        plt.xlabel("Year")
        plt.ylabel("Num of Students (in millions)")
        plt.xticks(self.yearArrInt, self.yearArrInt)
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        #plt.show() #WON'T NEED in GUI

        return totalStudents

    # Sums up students from each age group and graphs the results on a bar
graph by category (except Unknown)
    @showNums
    def plotByAgeGroups(self, year):

        # Find year's index
        idxCt = 0
        yearIdx = 0
        for i in self.yearArrInt:
            if i == year:
                yearIdx = idxCt
            idxCt += 1

        # Append sum from each category into list
        catg_sum_list = []
        for i in range(0,8):
            catg = [self.dataArrInt[j,yearIdx] for j in
range(len(self.dataArrInt)) if j % 8 == i]
            catg_sum_list.append(sum(catg))

        # Plot Data
        categoriesLabel = ["19 or less","20-24","25-29","30-34","35-
39","40-49","50+"]

        plt.bar(np.arange(len(categoriesLabel)),
catg_sum_list[0:(len(catg_sum_list)-1)], align='center')
        plt.title ("Enrollment By Categories")
        plt.xlabel("Categories")
        plt.ylabel("Num of Students")
        plt.xticks(np.arange(len(categoriesLabel)),categoriesLabel)
        #plt.show()

        return catg_sum_list

    # Returns years array for lab2.py to use in GUI
    def getYearArr(self):
        return self.yearArrInt

'''
def main():
    ed = EnrollData("students2.csv")
    ed.readFile()
    ed.plotEnrollTrend()
    ed.plotByAgeGroups(2008)
    ed.plotByAgeGroups(2017)


main()
'''
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