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# Input: Results of semester, ordered as
#         Multiple columns representing subject/subject code
#         Each row having Grades obtained by student, comma separated
#         Assuming grade as: S+, S, A, B, C, D, E, F, NE, NP, PP
#         Saved as a CSV, comma separated value file called result.csv
#
# To convert xlsx as csv:

# The Excel sheet should have columns that represent different subject, and
# each row content corresponding to grade obtained by the student for that subject
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# Excel Sheet:
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Code1	Code2	Code3
S1G1	S1G2	S1G3
S2G1	S2G2	S2G3
S3G1	S3G2	S3G3

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# An option is available in Excel / Calc of Save as CSV
# Save the result.xlsx as result.csv
# Excel Sheet result.xlsx
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Code1	Code2	Code3
S+	S	F
S+	A	F
F	S+	F

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# The result.csv will now have:
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#      Code1 , Code2, Code3
#      S+ , S , F
#      S+ , A , S
#      F , F , F
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# Output: Count of grades obtained in subject as csv
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#      Example output file "analysis.csv"
#      CourseCode, S+, S, A, B, C, D, E, F, NE, NP, PP, TF, TP, PassPercent
#      SubjectCode1, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 2, 66.66
#      SubjectCode2, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 3, 100
#      SubjectCode3, 0, 0, 0, 0, 0, 0, 0, 3, 0, 0, 0, 3, 0, 0
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#      where TF is Total Failed
#      TP is Total Passed
#      PassPercent = TP/(TP+TF)
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# If the analysis.csv file is opened in Excel / Calc then the same csv is
# displayed in tabular format as
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	S+	S	A	B	C	D	E	F	NE	NP	PP	TF	TP	PassPerc
Code1	2	0	0	0	0	0	0	1	0	0	0	1	2	66.66
Code2	1	1	1	0	0	0	0	0	0	0	0	0	3	100
Code2	0	0	0	0	0	0	0	3	0	0	0	3	0	0

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# initialize dictionary

# read result.csv

# For each student
#   For each subject grade
#     update dictionary
#
# write dictionary to analysis.csv

import csv

with open('result.csv', 'r') as csvfile:
    results = csv.reader(csvfile, delimiter=',')

    subjectCode = next(results, None)

    print ( "Subject Codes = ", subjectCode )
    print ( "Total number of Subjects = ", len(subjectCode) )

    subject={}
    for code in subjectCode:
        subject[code] = { 'S+': 0, 'S': 0, 'A': 0, 'B': 0, 'C': 0, 'D': 0,
                          'E': 0, 'F': 0, 'NE': 0, 'NP': 0, 'PP': 0,
                          'TF':0, 'TP':0, }

# consider PASS column of result

totalNumberOfStudents = 0

totalNumberOfPassStudents = 0

totalNumberOfFailStudents = 0

for row in results:

    totalNumberOfStudents = totalNumberOfStudents + 1

    fail = False

    for code, grade in zip( subjectCode, row ):

        if ( grade != ' ' ):

            subject[code][grade] = subject[code][grade] + 1
            # F is also incremented here

            if ( grade == 'F' ):
                subject[code]['TF'] = subject[code]['TF'] + 1
                fail = True
            elif ( grade == 'NE' ):
                pass
            else:
                subject[code]['TP'] = subject[code]['TP'] + 1

        if ( fail == True ):
            totalNumberOfFailStudents = totalNumberOfFailStudents + 1
        else:
            totalNumberOfPassStudents = totalNumberOfPassStudents + 1

with open('analysis.csv', 'w') as csvfile:
    writeAnalysis = csv.writer( csvfile , delimiter=',')
    writeAnalysis.writerow( [ 'SubjectCode', 'S+', 'S', 'A', 'B', 'C',
                              'D', 'E', 'F', 'NE', 'NP', 'PP',
                              'TF', 'TP', 'PassPerc' ] )

    for code in subjectCode:
        if ( subject[code]['TF'] + subject[code]['TP'] ) == 0:
            passPercentage = 0

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else:
    passPercentage = ( 100.00 * subject[code]['TP'] ) / ( subject[code]
['TF'] + subject[code]['TP'] )
    writeAnalysis.writerow( [ code , subject[code]['S+'] ,
                             subject[code]['S'] , subject[code]['A'] ,
                             subject[code]['B'] , subject[code]['C'] ,
                             subject[code]['D'] , subject[code]['E'] ,
                             subject[code]['F'] , subject[code]['NE'] ,
                             subject[code]['NP'] , subject[code]['PP'] ,
                             subject[code]['TF'] , subject[code]['TP'] ,
                             passPercentage ] )

    writeAnalysis.writerow( [ ] )
    writeAnalysis.writerow( [ ] )
    writeAnalysis.writerow( [ "OverallPerformance" ] )
    writeAnalysis.writerow( [ "TotalNumberOfStudents", totalNumberOfStudents ] )
    writeAnalysis.writerow( [ "TotalNumberOfFailStudents",
totalNumberOfFailStudents ] )
    writeAnalysis.writerow( [ "TotalNumberOfPassStudents",
totalNumberOfPassStudents ] )
    writeAnalysis.writerow( [ "PassPercentage", ( 100.00 *
totalNumberOfPassStudents ) / ( totalNumberOfPassStudents +
totalNumberOfFailStudents ) ] )

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print("analysis.csv created")

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# Save the result.csv and the Python script resultAnalysis.py is same folder
# Open Python Terminal and run this script as
# python resultAnalysis.py

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# If input result.csv , hence result.xlsx format was correct, then
#   analysis.csv will be generated
# Now open analysis.csv in Excel / Calc

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# Improvement: Use MapReduce?

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