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# -*- coding: utf-8 -*-
"""
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"""

from pulp import *
from ampyl import *

def diet_lp(dat_file_name):
    diet_lp_model = LpProblem(name='Diet LP', sense=LpMinimize)

    # Names within must match names in .dat file
    data = Amply("""
        set food_items;
        set nutrients;
        param objective{food_items};
        param reqs{nutrients};
        param supply{food_items,nutrients};
        param max_for_item{food_items};
    """) 

    # dat_file_name = 'wardRoom1.dat'
    data.load_file(open(dat_file_name))

    # diagnostic to see if things loaded and get used to indexing
    for nutr in data.nutrients:
        print('required ',nutr,data.reqs[nutr])
        for food in data.food_items:
            print('supply ',nutr,food,data.supply[food][nutr])

    # Dec vars
    x = LpVariable.dicts('x',data.food_items,0)

    # objective
    diet_lp_model += lpSum(data.objective[i] * x[i] for i in data.food_items)

    # constraints - loop through reqs adding an lpSum for each
    for i in data.nutrients:
        constr_LHS = lpSum(data.supply[j][i] * x[j] for j in data.food_items)
        diet_lp_model += constr_LHS >= data.reqs[i], i

    # upper limits
    for i in data.food_items:
        diet_lp_model += x[i] <= data.max_for_item[i], i

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# the rest as before...
# Print formulated model and optionally write it to a file
print(diet_lp_model)
diet_lp_model.writeLP('diet_lp_model.txt')

# Solve
result = diet_lp_model.solve(GLPK(msg=False))

# Print results
print("Status: ",LpStatus[result])
for variable in diet_lp_model.variables():
    print(str(variable).ljust(12), ' = ', value(variable))
print(f"Objective value = {value(diet_lp_model.objective):8.2f}")

return diet_lp_model
#% wardroom_1.dat
set food_items := Noodles TurkeyDivan PotatoSalad Beets CongoBars;

set nutrients := Protein     Iron       Niacin     Thiamin   VitaminC;

param      objective :=
Noodles      5000
TurkeyDivan  5000
PotatoSalad  7900
Beets        300
CongoBars   14300;

param          reqs :=
Protein      63000
Iron         10
Niacin       15
Thiamin      1
VitaminC    50;

param      supply  :
                           Protein  Iron   Niacin  Thiamin  VitaminC :=
Noodles      5000   1.1    1.4    0.18    0.0
TurkeyDivan  29300  1.8    5.4    0.06    0.0
PotatoSalad  5300   0.5    0.9    0.06   10.0
Beets       3000   2.2    0.5    0.07   28.0
CongoBars   4000   1.2    0.6    0.15   3.0;

param      max_for_item :=
Noodles      3
TurkeyDivan  3
PotatoSalad  2
Beets        1

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    CongoBars  1;
#%% Solns
"""

Diet_LP:
MINIMIZE
300.0*x_Beets + 14300.0*x_CongoBars + 5000.0*x_Noodles + 7900.0*x_PotatoSalad
+ 5000.0*x_TurkeyDivan + 0.0
SUBJECT TO
Protein: 3000 x_Beets + 4000 x_CongoBars + 5000 x_Noodles + 5300 x_PotatoSalad
+ 29300 x_TurkeyDivan >= 63000

Iron: 2.2 x_Beets + 1.2 x_CongoBars + 1.1 x_Noodles + 0.5 x_PotatoSalad
+ 1.8 x_TurkeyDivan >= 10

Niacin: 0.5 x_Beets + 0.6 x_CongoBars + 1.4 x_Noodles + 0.9 x_PotatoSalad
+ 5.4 x_TurkeyDivan >= 15

Thiamin: 0.07 x_Beets + 0.15 x_CongoBars + 0.18 x_Noodles + 0.06 x_PotatoSalad
+ 0.06 x_TurkeyDivan >= 1

VitaminC: 28 x_Beets + 3 x_CongoBars + 10 x_PotatoSalad >= 50

Noodles: x_Noodles <= 3

TurkeyDivan: x_TurkeyDivan <= 3

PotatoSalad: x_PotatoSalad <= 2

Beets: x_Beets <= 1

CongoBars: x_CongoBars <= 1

VARIABLES
x_Beets Continuous
x_CongoBars Continuous
x_Noodles Continuous
x_PotatoSalad Continuous
x_TurkeyDivan Continuous

Status: Optimal
x_Beets      = 1.0
x_CongoBars   = 0.666667
x_Noodles     = 3.0
x_PotatoSalad = 2.0
x_TurkeyDivan = 2.83333
Objective value = 54799.99
"""

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#% wardroom_2.dat
set food_items := oats chicken eggs milk cake beans;

set nutrients := calories protein calcium;

param objective :=
  oats 30
  chicken 240
  eggs 130
  milk 90
  cake 200
  beans 60;

param          reqs :=
  calories 2000
  protein 55
  calcium 800;

param      supply   :
                           calories protein calcium :=
  oats 110 4 2
  chicken 205 32 12
  eggs 160 13 54
  milk 160 8 285
  cake 420 4 22
  beans 260 14 80;

param      max_for_item :=
  oats 4
  chicken 3
  eggs 2
  milk 8
  cake 2
  beans 2;
#% Solns
"""

Diet_LP:
MINIMIZE
60.0*x_beans + 200.0*x_cake + 240.0*x_chicken + 130.0*x_eggs + 90.0*x_milk +
30.0*x_oats + 0.0
SUBJECT TO
calories: 260 x_beans + 420 x_cake + 205 x_chicken + 160 x_eggs + 160 x_milk +
+ 110 x_oats >= 2000

protein: 14 x_beans + 4 x_cake + 32 x_chicken + 13 x_eggs + 8 x_milk +
+ 4 x_oats >= 55

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calcium: 80 x_beans + 22 x_cake + 12 x_chicken + 54 x_eggs + 285 x_milk
+ 2 x_oats >= 800

oats: x_oats <= 4

chicken: x_chicken <= 3

eggs: x_eggs <= 2

milk: x_milk <= 8

cake: x_cake <= 2

beans: x_beans <= 2

VARIABLES
x_beans Continuous
x_cake Continuous
x_chicken Continuous
x_eggs Continuous
x_milk Continuous
x_oats Continuous

Status: Optimal
x_beans      =  2.0
x_cake       =  1.68084
x_chicken    =  0.0
x_eggs       =  0.0
x_milk       =  2.08779
x_oats       =  4.0
Objective value =  764.07
"""

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