This repository includes files related to the Risk Averse Stochastic Knapsack Problem.

Java files are mainly utilized to create data, write GAMS model files, read GAMS output files and for other algorithmic purposes. GAMS program is utilized to solve the optimization problems. Note that tests are done for Poisson and Normal distributions for varying problem sizes.

Key Java files, input and output files are included in the repository. Below, more explanation is included for the folders and files in the directory.

Variables
File names may include the following variables.

customer = Problem size/ number of items
y = Instance/case index
run = SAA sample index in a batch.
con = Problem type.
0 = E
1 = FR MSD
2 = FC MSD
3/4 = FR CVaR
5 = FC CVaR
N/Normal= Normal distribution
Poisson= Poisson distribution
GAMS= LindoGlobal
SAA= SAA
Sensitivity= Sensitivity analysis

1. **Java Files**

Normal Distribution

- NDataSKP.java
  Purpose: The purpose of this file is to create data (including item weight scenarios) according to parameter settings on a file.
  Output: SKPriskNormalSize" + customer + "case" + y + "run"+run+".txt

- SKPriskGAMSnormal.java
  Purpose: The purpose of this file is to read from the input data file and write GAMS files for LG solution method. This file also produces a GAMS Script.
  Input: SKPriskNormalSize"+customer+"case" + y + "run"+ca+".txt;
  Output: SKPGAMSscriptNORMAL.gms
  SKPriskGAMSnormal"+sl+"type="+con+"relaxed"+rel+ "run" + ca + "cust" + customer + "case" + y + ".gms

- SKPriskSAANormal.java

Purpose: The purpose of this file is to read from the input data file and to create GAMS files for SAA problems. It also creates a Script for the SAA.
Input: SKPriskNormalSize"+customer+"case" + y + "run"+ca+".txt";
Output: SKPriskSAANormal"+sl+"type="+con+"relaxed"+rel+ "run" + ca + "cust" + customer + "case" + y + ".gms

- NormalCalculate.java
  Purpose: Calculate the exact objective function of a solution using Nonlinear functions defined in the paper.
  Input: SKPriskNormalSize"+customer+"case" + y + "run"+ca+".txt" SKPriskSAANormal"+si+"type="+con+"relaxed"+rel+ "run1cust" + customer + "case" + y + ".lst
  Output: NormalCalculate"+sl+"type="+con+"relaxed"+rel+ "run" + ca + "cust" + customer + "case" + y + ".gms

Poisson Distribution

- PoissonDataSKP.java
  Purpose: The purpose of this file is to create data (including item weight scenarios) according to parameter settings on a file.
  Output: PoissonDataSon" + *customer* + "case" + *y* + "run"+*run*+".txt

- SKPriskGAMSpoisson.java
  Purpose: The purpose of this file is to read from the input data file and write GAMS files for LG solution method. This file also produces a GAMS Script.
  Input: PoissonDataSon" + *customer* + "case" + *y* + "run"+*run*+".txt
  Output: SKPriskGAMSscriptPOISSON.gms
  Output: SKPriskGAMSpoisson3type="+*con*+"relaxed"+*rel*+ "run" + *run* + "cust" + *customer* + "case" + y + ".gms" (Script file to run files in GAMS)

- SKPriskSAAPoisson.java
  Purpose: The purpose of this file is to read from the input data file and to create GAMS files for SAA problems. It also creates a Script for the SAA.
  Input: PoissonDataSon" + *customer* + "case" + *y* + "run"+*run*+".txt
  Output: SKPriskSAAPoissonSCRIPT.gms Script file to run files in GAMS.
  Output: SaaPoissonSon0type ="+con+"relaxed"+rel+ "run" + ca + "cust" + customer + "case" + y + ".gms

- SKPSAABound.java
  Purpose: Select the best SAA run from the batch and write a GAMS model with 10000 scenarios.
  Input: PoissonDataSon" + customer + "case" + y + "run1.txt; SaaPoissonSon0type="+con+"relaxed"+rel+ "run" + ca + "cust" + supplier + "case" + y + ".lst
  Output: SKPSAABuyuk"+sl+"type="+con+"relaxed"+rel+ "run" + ca + "cust" + customer + "case" + y + ".gms

SKPGAMSBound.java

Purpose:	Read the GAMS output and write a GAMS model with 10000 Poisson scenarios.
Input:	PoissonDataSon" + customer + "case" + y + "run1.txt; SKPriskGAMSpoisson3type="+con+"relaxed"+rel+ "run" + ca + "cust" + supplier + "case" + y + ".lst"
Output:	SKPGAMSBuyuk"+sl+"type="+con+"relaxed"+rel+ "run" + ca + "cust" + customer + "case" + y + ".gms;

Input Output Files

Zipped folders includes input/output data for solving the related problem.

Files are organized separately under separate folders (Normal and Poisson distribution and also for the solution methodology).

Normal distribution

- NormalSAA.zip includes the SAA related data (part 1,2,3).
- NormalCalculate.zip includes the exact objective function calculation of SAA output.
- NormalLG.zip includes the LindoGlobal related data.
- NormalH.zip includes the heuristic related data.
- NormalSensitivity.zip includes the data related to the sensitivity analysis.

Poisson distribution

- PoissonLG.zip includes the LindoGlobal related data.
- Poisson SAA1.zip includes the SAA related data (part 1,2,3).
- Poisson H Bound.zip includes files that are used to estimate the objective function value of a solution given by the H method (Poisson scenarios). (part 1,2,3,5).
- Poisson LG Bound.zip includes files that are used to estimate the objective function value of a solution given by the LG method (Poisson scenarios). (part 1-12)
- Poisson SAA Bound.zip includes that are used to estimate the objective function value of a solution given by the SAA method (Poisson scenarios). (parts)

Input files within the folders use the variable names given at the beginning of this document. They are also explained within the Java files explanation.

If you have any question, please contact Yasemin Merzifonluoglu (Y.Merzifonluoglu@uvt.nl).