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بر اساس پروتکل‌های دوره‌های آموزشی آپتیمیار، به اشتراک‌گذاری محتوا و کدهای نرم‌افزاری از منظر حقوقی ممنوع است و از منظر اخلاقی نارضایتی مدرس دوره و گروه آپتیمیار را به همراه دارد.

از توجه شما به پروتکل دوره‌های آموزشی آپتیمیار سپاسگزاریم.

دوره جامع آنلاین بهینه‌سازی استوار و برنامه‌ریزی در شرایط عدم قطعیت همراه با کدنویسی در نرم‌افزار (GAMS)

Decision-Making under Uncertainty (Robust Optimization - Stochastic Programming - Fuzzy Programming)

مدرس:

[دکتر علی پایی \(Ali Papi\)](#)

تخصص شاخص: بهینه‌سازی و تحقیق در عملیات، علم تحلیل داده، تکنیک‌های تجزیه و روش‌های حل دقیق، بهینه‌سازی استوار داده‌محور، هوش محاسباتی و الگوریتم‌های فرآیندکاری، نظریه بازی، بهینه‌سازی چندهدفه و تصمیم‌گیری چندمعیاره

Optimization & Operations Research, Data Analytics, Computational Intelligence & Metaheuristics, Decomposition Techniques & Exact Methods, Data-Driven Robust Optimization, Game Theory, Multi Criteria Decision Making

OptimYar

[SCND_Nominal](#)

[SCND_RNSSE](#)

[SCND_RASSP](#)

[SCND_HybridSSP](#)

[SCND_Regret](#)

[SCND_RelativeRegret](#)

[SCND_Aghezzaf](#)

[SCND_DevelopedHybridModel](#)



اخطار: بر اساس پروتکل های دوره های آموزشی آپتیمیار، به اشتراک گذاری محتوا و کدهای نرم افزاری از منظر حقوقی ممنوع است و از منظر اخلاقی نارضایتی مدرس دوره و گروه آپتیمیار را به همراه دارد.

[از توجه شما به پروتکل دوره های آموزشی آپتیمیار سپاسگزاریم.](#)

SCND_Nominal

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

A(s) = uniform(1000,1500);

f(d) = uniform(2000,3000);

b(s) = uniform(5,10);

trSD(s,d)= uniform(1,2);

trDC(d,c)= uniform(0.5,0.7);

p = 15;

capD(d) = uniform(500,1000);

capS(s) = uniform(1000,2000);

dem(c,'w1') = uniform(50,100);

dem(c,'w2') = (1+0.8)*dem(c,'w1') ;

dem(c,'w3') = (1+0.2)*dem(c,'w1') ;

dem(c,'w4') = (1-0.2)*dem(c,'w1') ;

dem(c,'w5') = (1-0.3)*dem(c,'w1') ;

dem_N(c)= sum(w,prob(w)*dem(c,w));

Free Variable

Z;

Binary Variables

y(s)

x(d)

;

Positive Variable

u(s)
QSD(s,d)
QDC(d,c)
;

Equations

obj

cons1

cons2

cons3

cons4

cons5

;

obj.. z =e= p*sum({d,c},QDC(d,c)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d)) + sum({d,c},trDC(d,c)*QDC(d,c)) + sum(s,b(s)*u(s))) ;

cons1(s).. u(s) =L= capS(s)*y(s);

cons2(d).. sum(S,QSD(s,d))=L= capD(d)*x(d);

cons3(s).. u(s) =e= sum(d,QSD(s,d));

cons4(d).. sum(s,QSD(s,d)) =e= sum(c,QDC(d,c));

cons5(c).. sum(d,QDC(d,c)) =l= dem_N(c);

Model SCND

```
/  
obj  
cons1  
cons2  
cons3  
cons4  
cons5  
/  
;
```

Options

```
mip = CPLEX  
reslim = 100  
optcr = 0  
;
```

Solve SCND us mip max Z;

Display

```
Z.l  
y.l  
x.l  
QSD.l  
QDC.l  
;
```

SCND RNSSP

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

```
A(s) = uniform(1000,1500);  
f(d) = uniform(2000,3000);  
b(s) = uniform(5,10);  
trSD(s,d)= uniform(1,2);  
trDC(d,c)= uniform(0.5,0.7);  
p = 15;  
capD(d) = uniform(500,1000);  
capS(s) = uniform(1000,2000);
```

```
dem(c,'w1') = uniform(50,100);  
dem(c,'w2') = (1+0.8)*dem(c,'w1');  
dem(c,'w3') = (1+0.2)*dem(c,'w1');  
dem(c,'w4') = (1-0.2)*dem(c,'w1');  
dem(c,'w5') = (1-0.3)*dem(c,'w1');
```

```
dem_N(c)= sum(w,prob(w)*dem(c,w));
```

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

Z(w)

EB

;

OR

Binary Variables

y(s)

x(d)

;

Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

;

Equations

obj_RNSSP



OptimYar

The OptimYar logo is a large, stylized graphic in the background. It features a central white circle containing the letters 'OR'. This circle is part of a larger, three-dimensional looking structure composed of several interlocking and overlapping blue and purple curved shapes, resembling a gear or a series of arrows pointing in various directions.

obj_Scenario

cons1

cons2

cons3

cons4

cons5

;

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_Scenario(w).. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d,w)) + sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_RNSSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

/

;

Options

mip = CPLEX

reslim = 100

optcr = 0

;

Solve SCND us mip max EB;

Display

EB.l

Z.l

y.l

x.l

QSD.l

QDC.l

;

SCND RASSP

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

A(s) = uniform(1000,1500);

f(d) = uniform(2000,3000);

b(s) = uniform(5,10);

trSD(s,d)= uniform(1,2);

trDC(d,c)= uniform(0.5,0.7);

p = 15;

capD(d) = uniform(500,1000);

capS(s) = uniform(1000,2000);

dem(c,'w1') = uniform(50,100);

dem(c,'w2') = (1+0.8)*dem(c,'w1') ;

dem(c,'w3') = (1+0.2)*dem(c,'w1') ;

dem(c,'w4') = (1-0.2)*dem(c,'w1') ;

dem(c,'w5') = (1-0.3)*dem(c,'w1') ;

dem_N(c)= sum(w,prob(w)*dem(c,w));

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

Z(w)

EB

WB

;

Binary Variables

y(s)

x(d)

;

Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

;

Equations

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4



The logo for OptimYar features a central gear with the letters "OR" inside it. Two white arrows point from the gear towards the right, each accompanied by a blue and purple wavy line. Below the gear, the word "OptimYar" is written in a large, bold, blue sans-serif font.

OptimYar

cons5

;

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_RASSP(w).. WB =l= Z(w);

obj_Scenario(w) .. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d,w)) + sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

```
cons4  
cons5  
/  
;  
Options  
mip = CPLEX  
reslim =100  
optcr = 0  
;
```

Solve SCND us mip max WB;

Display

WB.1

EB.1

Z.1

y.1

x.1

QSD.1

QDC.1

;

OptimYar

SCND HybridSSP

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

```
A(s) = uniform(1000,1500);  
f(d) = uniform(2000,3000);  
b(s) = uniform(5,10);  
trSD(s,d)= uniform(1,2);  
trDC(d,c)= uniform(0.5,0.7);  
p = 15;  
capD(d) = uniform(500,1000);  
capS(s) = uniform(1000,2000);
```

```
dem(c,'w1') = uniform(50,100);  
dem(c,'w2') = (1+0.8)*dem(c,'w1');  
dem(c,'w3') = (1+0.2)*dem(c,'w1');  
dem(c,'w4') = (1-0.2)*dem(c,'w1');  
dem(c,'w5') = (1-0.3)*dem(c,'w1');  
  
dem_N(c)= sum(w,prob(w)*dem(c,w));
```

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

Z(w)

EB

WB

HO

;

Binary Variables

y(s)

x(d)

;

Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

;

OptimYar

Equations

obj_Hybrid

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

;

Sets

Iter /iter0*iter10/

Parameter

Lamda

L(iter)

*Worst-Case Importancy (0,1)

;

L(iter)=(ord(iter)-1)/(card(iter)-1);

Display L;

;

obj_Hybrid.. HO =e= Lamda*WB + (1-Lamda)*EB;

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_RASSP(w).. WB =l= Z(w);

obj_Scenario(w) .. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d,w))

+ sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_Hybrid

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

/

;

Options

mip = CPLEX

reslim =100

optcr = 0

;

Parameters

WorstCaseBenefit(iter)

ExpectefBenefit (iter)

Result(iter,*)

;

Loop(iter,

Lamda=L(iter);

Solve SCND us mip max HO;

WorstCaseBenefit(iter)=WB.l;

ExpectefBenefit (iter)=EB.l;

Result(iter,'Lamda') = Lamda;

Result(iter,'WB') = WB.l;

Result(iter,'EB') = EB.l;

Display

HO.l

WB.l

EB.l

Z.l

y.l

x.l

QSD.l

QDC.l

;

);

*end if loop

Display

Result



SCND Regret

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

dem_w(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

```
A(s) = uniform(1000,1500);  
f(d) = uniform(2000,3000);  
b(s) = uniform(5,10);  
trSD(s,d)= uniform(1,2);  
trDC(d,c)= uniform(0.5,0.7);  
p = 15;  
capD(d) = uniform(500,1000);  
capS(s) = uniform(1000,2000);
```

```
dem(c,'w1') = uniform(50,100);  
dem(c,'w2') = (1+0.8)*dem(c,'w1');  
dem(c,'w3') = (1+0.2)*dem(c,'w1');  
dem(c,'w4') = (1-0.2)*dem(c,'w1');  
dem(c,'w5') = (1-0.3)*dem(c,'w1');
```

```
dem_N(c)= sum(w,prob(w)*dem(c,w));
```

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

AR

RR

Z_w

Z(w)

EB

WB

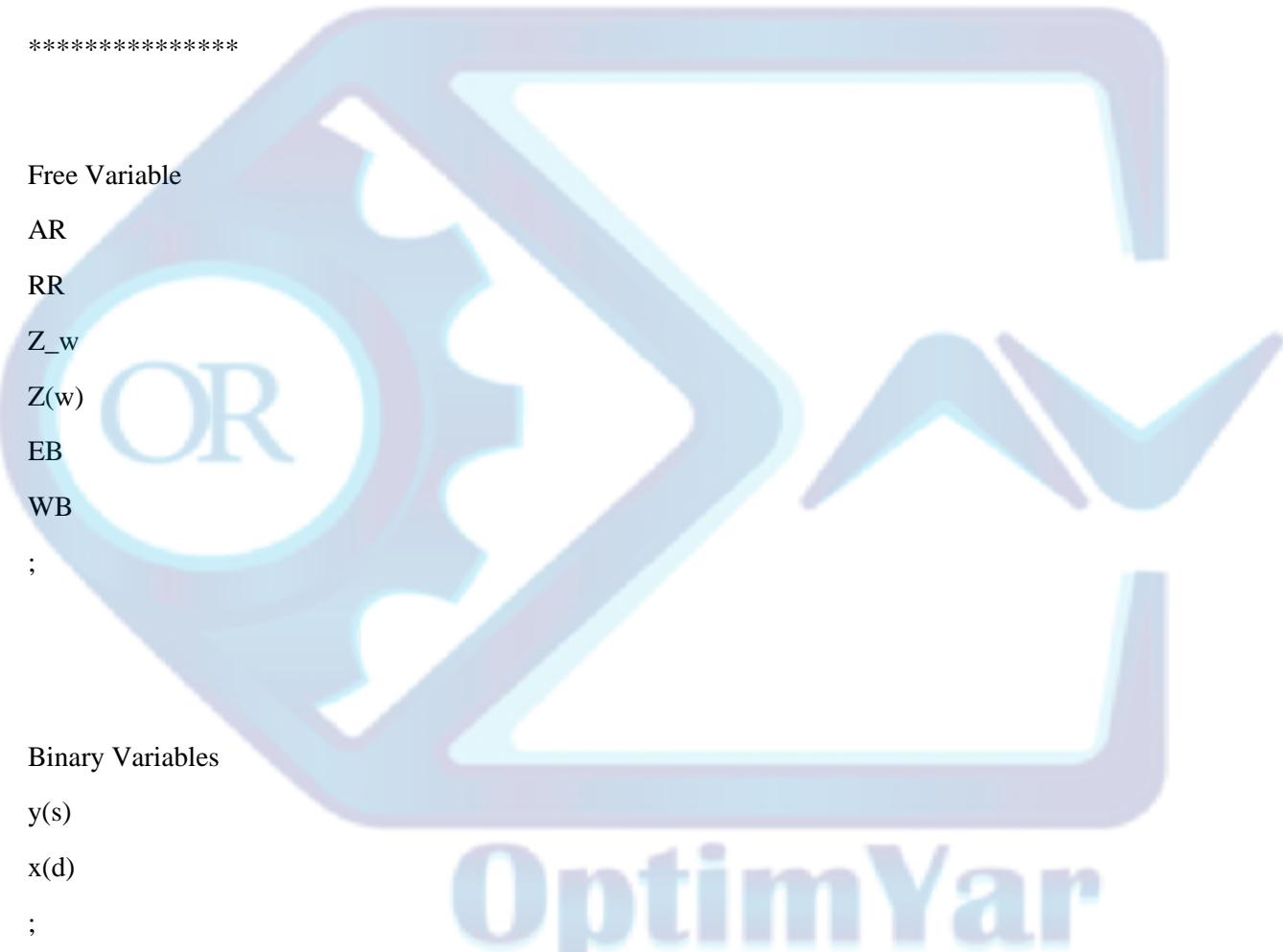
;

Binary Variables

y(s)

x(d)

;



OptimYar

The logo features a central gear with the letters "OR" inside it. Two white arrows point from the gear towards the right, each passing through a series of overlapping blue and purple curved bands. The background of the logo is a light blue gradient.

Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

u_w(s)
QSD_w(s,d)
QDC_w(d,c)
;

Equations

obj_AR

obj_RNSSP

obj_RASSP

obj_Scenario

obj_w

cons1

cons2

cons3

cons4

cons5

cons1_w

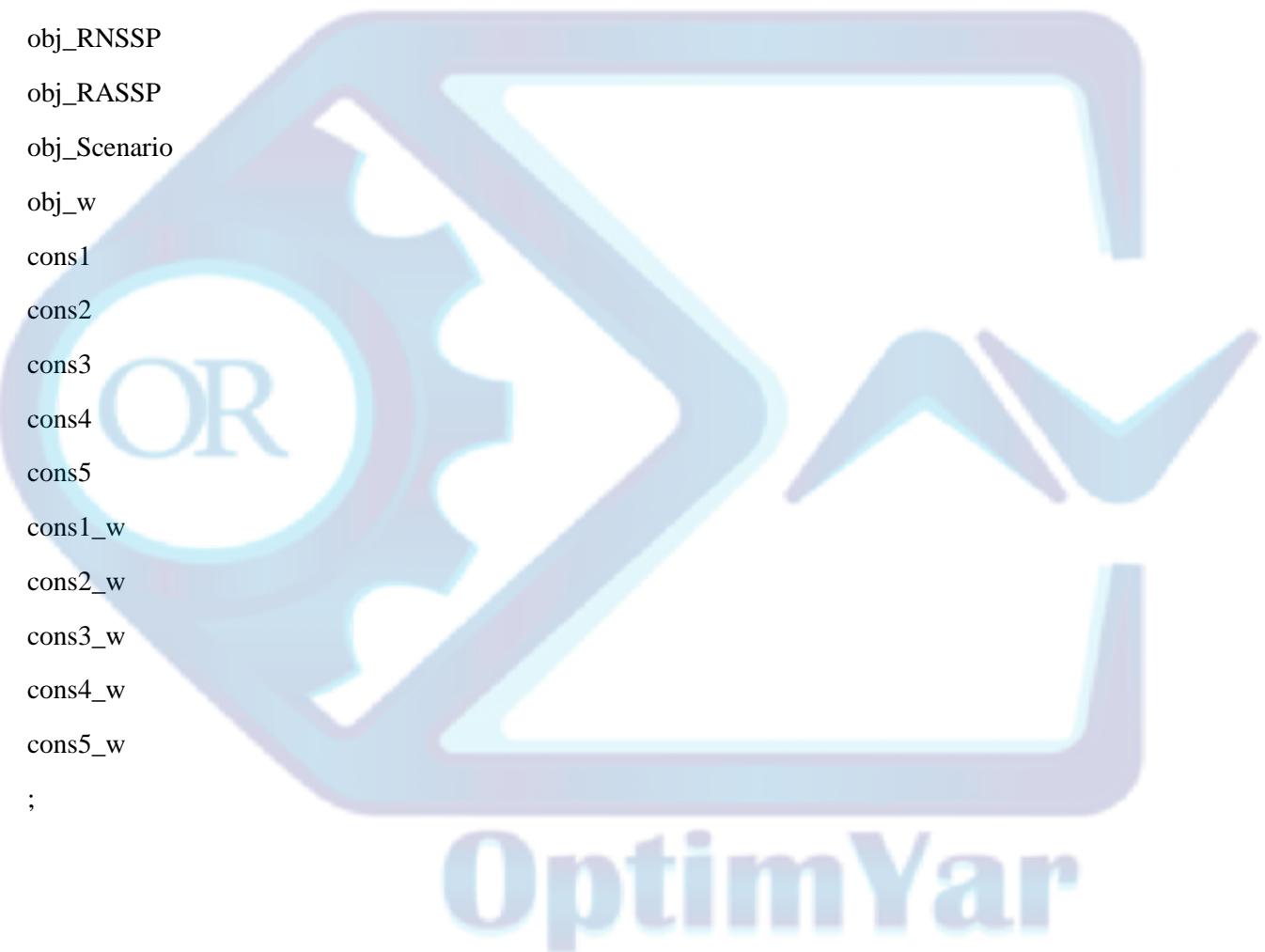
cons2_w

cons3_w

cons4_w

cons5_w

;



obj_w .. Z_w =e= p*sum({d,c},QDC_w(d,c)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) +
sum({s,d},trSD(s,d)*QSD_w(s,d))
+ sum({d,c},trDC(d,c)*QDC_w(d,c)) + sum(s,b(s)*u_w(s))) ;

cons1_w(s).. u_w(s) =L= capS(s)*y(s);

cons2_w(d).. sum(S,QSD_w(s,d))=L= capD(d)*x(d);

cons3_w(s).. u_w(s) =e= sum(d,QSD_w(s,d));

cons4_w(d).. sum(s,QSD_w(s,d)) =e= sum(c,QDC_w(d,c));

cons5_w(c).. sum(d,QDC_w(d,c)) =l= dem_w(c);

Model SCND_W

/

obj_w

cons1_w

cons2_w

cons3_w

cons4_w

cons5_w

/

;

Options

Optcr=0;

Parameters

ZS(w);

Loop(w,

dem_w(c)=dem(c,w) ;

Solve SCND_w us mip max Z_w;

ZS(w)= Z_w.l;

);

*end of loop

Display ZS;

obj_AR(w).. AR =g= ZS(w) - Z(w);

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_RASSP(w).. WB =l= Z(w);

obj_Scenario(w) .. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d,w))

+ sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_AR

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

/

;

Options

mip = CPLEX

reslim =100

optcr = 0

;

Solve SCND us mip min AR;

Display

AR.1

EB.1

WB.1

Z.1

y.1

x.1

QSD.1

QDC.1

;



OptimYar

The logo features a large, light blue gear on the left side. Inside the gear, the letters "OR" are prominently displayed. To the right of the gear, there is a white area containing several blue and purple arrows pointing in various directions, suggesting motion or optimization. Below this graphic, the word "OptimYar" is written in a large, bold, sans-serif font, with "Optim" in blue and "Yar" in purple.

SCND RelativeRegret

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

dem_w(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

```
A(s) = uniform(1000,1500);  
f(d) = uniform(2000,3000);  
b(s) = uniform(5,10);  
trSD(s,d)= uniform(1,2);  
trDC(d,c)= uniform(0.5,0.7);  
p = 15;  
capD(d) = uniform(500,1000);  
capS(s) = uniform(1000,2000);
```

```
dem(c,'w1') = uniform(50,100);  
dem(c,'w2') = (1+0.8)*dem(c,'w1');  
dem(c,'w3') = (1+0.2)*dem(c,'w1');  
dem(c,'w4') = (1-0.2)*dem(c,'w1');  
dem(c,'w5') = (1-0.3)*dem(c,'w1');
```

```
dem_N(c)= sum(w,prob(w)*dem(c,w));
```

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

AR

RR

Z_w

Z(w)

EB

WB

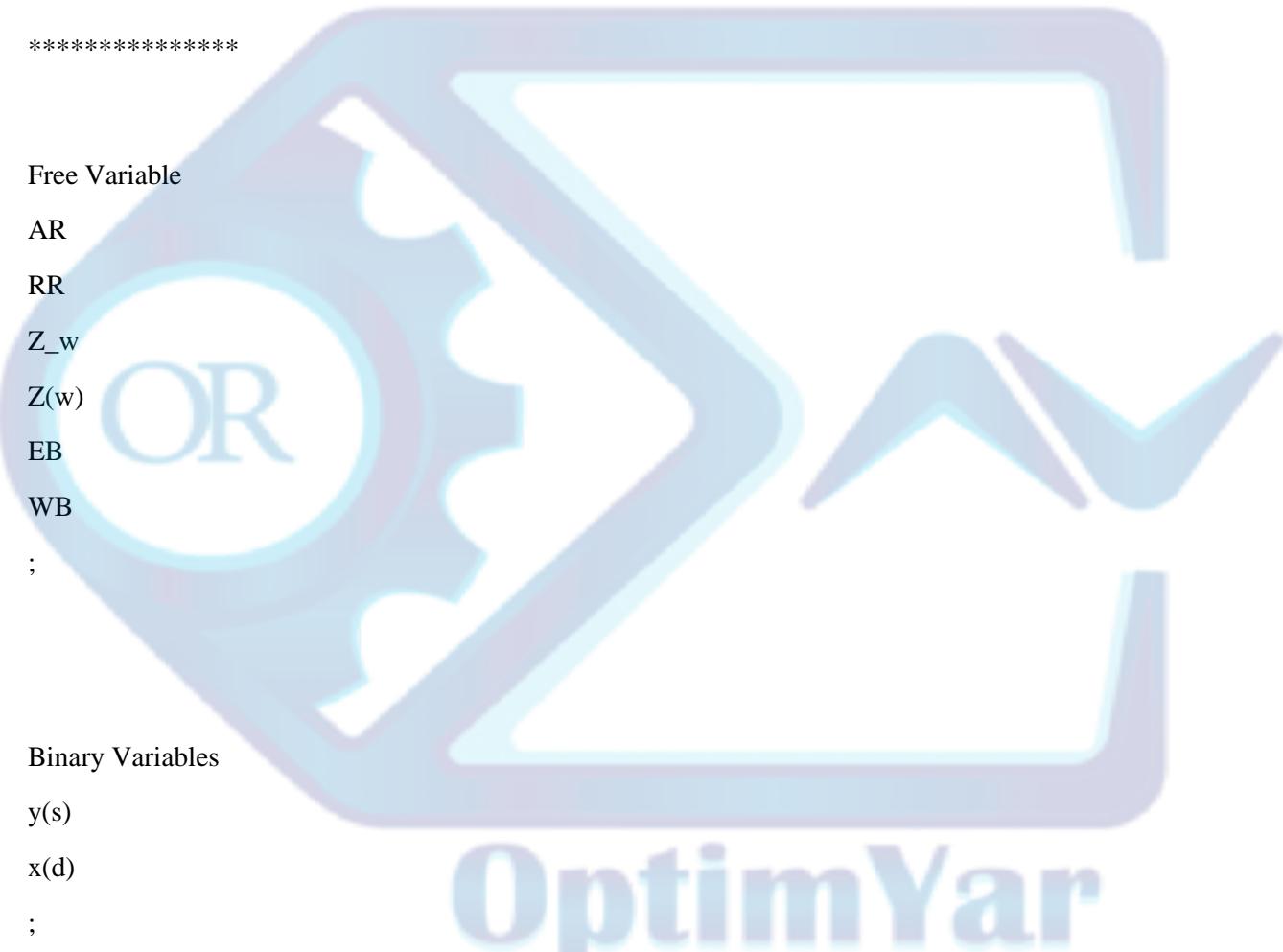
;

Binary Variables

y(s)

x(d)

;



OptimYar

The logo features a central gear with the letters "OR" inside it. Two white arrows point from the gear towards the right, each passing through a series of overlapping blue and purple curved bands. The background of the logo is a light blue gradient.

Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

```
u_w(s)
QSD_w(s,d)
QDC_w(d,c)
;
```

Equations

obj_RR

obj_AR

obj_RNSSP

obj_RASSP

obj_Scenario

obj_w

cons1

cons2

cons3

cons4

cons5

cons1_w

cons2_w

cons3_w

cons4_w

cons5_w

;



```
obj_w .. Z_w =e= p*sum({d,c},QDC_w(d,c)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) +  
sum({s,d},trSD(s,d)*QSD_w(s,d))
```

+ sum({d,c},trDC(d,c)*QDC_w(d,c)) + sum(s,b(s)*u_w(s))) ;

cons1_w(s).. u_w(s) =L= capS(s)*y(s);

cons2_w(d).. sum(S,QSD_w(s,d))=L= capD(d)*x(d);

cons3_w(s).. u_w(s) =e= sum(d,QSD_w(s,d));

cons4_w(d).. sum(s,QSD_w(s,d)) =e= sum(c,QDC_w(d,c));

cons5_w(c).. sum(d,QDC_w(d,c)) =l= dem_w(c);

Model SCND_W

/

obj_w

cons1_w

cons2_w

cons3_w

cons4_w

cons5_w

/

;

Options

Optcr=0;

Parameters

ZS(w);

Loop(w,

dem_w(c)=dem(c,w) ;

Solve SCND_w us mip max Z_w;

ZS(w)= Z_w.l;

);

*end of loop

Display ZS;

obj_RR(w).. RR =g= Prob(w)*(ZS(w) - Z(w))/(abs(ZS(w))+0.001);

obj_AR(w).. AR =g= ZS(w) - Z(w);

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_RASSP(w).. WB =l= Z(w);

obj_Scenario(w) .. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d,w)))

+ sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_RR

obj_AR

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

/

;

Options

mip = CPLEX

reslim =100

optcr = 0

;

Solve SCND us mip min RR;

Display

RR.1

AR.1

EB.1

WB.1

Z.1

y.1

x.1

QSD.1

QDC.1

;

OptimYar

SCND Aghezzaf

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

dem_w(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

```
A(s) = uniform(1000,1500);  
f(d) = uniform(2000,3000);  
b(s) = uniform(5,10);  
trSD(s,d)= uniform(1,2);  
trDC(d,c)= uniform(0.5,0.7);  
p = 15;  
capD(d) = uniform(500,1000);  
capS(s) = uniform(1000,2000);
```

```
dem(c,'w1') = uniform(50,100);  
dem(c,'w2') = (1+0.8)*dem(c,'w1');  
dem(c,'w3') = (1+0.2)*dem(c,'w1');  
dem(c,'w4') = (1-0.2)*dem(c,'w1');  
dem(c,'w5') = (1-0.3)*dem(c,'w1');
```

```
dem_N(c)= sum(w,prob(w)*dem(c,w));
```

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

AR

RR

Z_w

Z(w)

Z_Agh

EB

WB

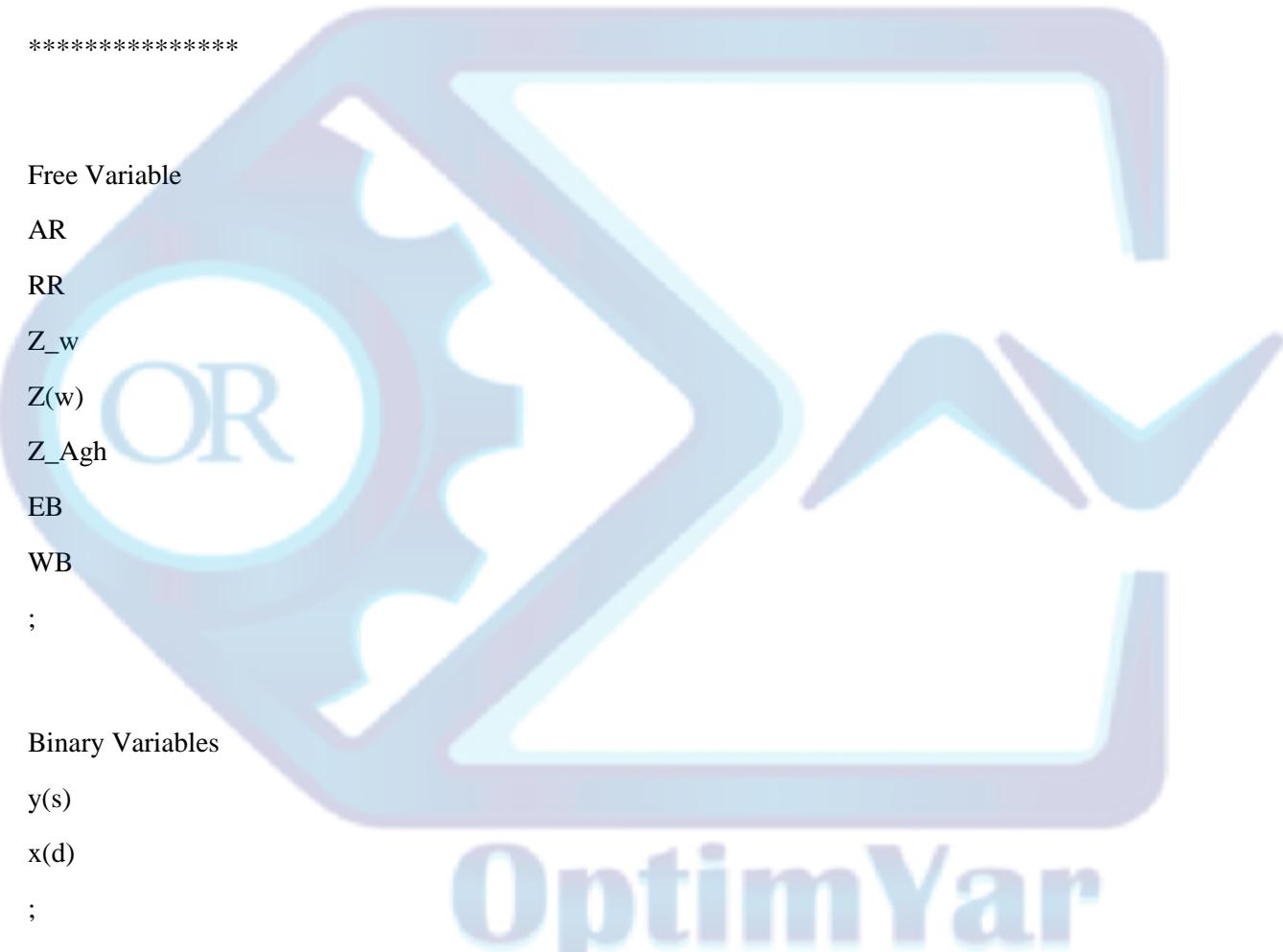
;

Binary Variables

y(s)

x(d)

;



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Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

u_w(s)

QSD_w(s,d)

QDC_w(d,c)

;

Equations

obj_Agh

obj_RR

obj_AR

obj_RNSSP

obj_RASSP

obj_Scenario

obj_w

cons1

cons2

cons3

cons4

cons5

cons1_w

cons2_w

cons3_w

cons4_w

cons5_w

;

obj_w .. Z_w =e= p*sum({d,c},QDC_w(d,c)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD_w(s,d))

+ sum({d,c},trDC(d,c)*QDC_w(d,c)) + sum(s,b(s)*u_w(s))) ;

cons1_w(s).. u_w(s) =L= capS(s)*y(s);

cons2_w(d).. sum(S,QSD_w(s,d))=L= capD(d)*x(d);

cons3_w(s).. u_w(s) =e= sum(d,QSD_w(s,d));

cons4_w(d).. sum(s,QSD_w(s,d)) =e= sum(c,QDC_w(d,c));

cons5_w(c).. sum(d,QDC_w(d,c)) =l= dem_w(c);

Model SCND_W

/

obj_w

cons1_w

cons2_w

cons3_w

cons4_w

cons5_w

/

;

Options

Optcr=0;

Parameters

ZS(w);

Loop(w,

dem_w(c)=dem(c,w) ;

Solve SCND_w us mip max Z_w;

ZS(w)= Z_w.l;

);

*end of loop

Display ZS;

Scalar Lamda /0.3/;

obj_Agh.. Z_Agh=e= EB/(6763-4444) - Lamda*RR/(0.132-0.118);

obj_RR(w).. RR =g= Prob(w)*(ZS(w) - Z(w))/(abs(ZS(w))+0.001);

obj_AR(w).. AR =g= ZS(w) - Z(w);

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_RASSP(w).. WB =l= Z(w);

obj_Scenario(w) .. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) + sum({s,d},trSD(s,d)*QSD(s,d,w)))

+ sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_Agh

obj_RR

obj_AR

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

/

;

Options

mip = CPLEX

reslim =100

optcr = 0

;

Solve SCND us mip max Z_Agh;

Display

RR.1

AR.1

EB.1

WB.1

Z.1

y.1

x.1

QSD.1

QDC.1

;

SCND Developed Hybrid Model

Sets

S /s1*s10/

D /d1*d20/

C /c1*c30/

w /w1*w5/

;

Parameters

A(s)

f(d)

b(s)

trSD(s,d)

trDC(d,c)

p

dem(c,w)

dem_N(c)

dem_w(c)

capD(d)

capS(s)

Prob(w)

/

w1 0.2

w2 0.3

w3 0.1

w4 0.2

w5 0.2

/

;

```
A(s) = uniform(1000,1500);  
f(d) = uniform(2000,3000);  
b(s) = uniform(5,10);  
trSD(s,d)= uniform(1,2);  
trDC(d,c)= uniform(0.5,0.7);  
p = 15;  
capD(d) = uniform(500,1000);  
capS(s) = uniform(1000,2000);
```

```
dem(c,'w1') = uniform(50,100);  
dem(c,'w2') = (1+0.8)*dem(c,'w1');  
dem(c,'w3') = (1+0.2)*dem(c,'w1');  
dem(c,'w4') = (1-0.2)*dem(c,'w1');  
dem(c,'w5') = (1-0.3)*dem(c,'w1');
```

```
dem_N(c)= sum(w,prob(w)*dem(c,w));
```

Display

A

f

b

trSD

trDC

p

capD

capS

dem

dem_N

;

Free Variable

AR

RR

Z_w

Z(w)

HO

EB

WB

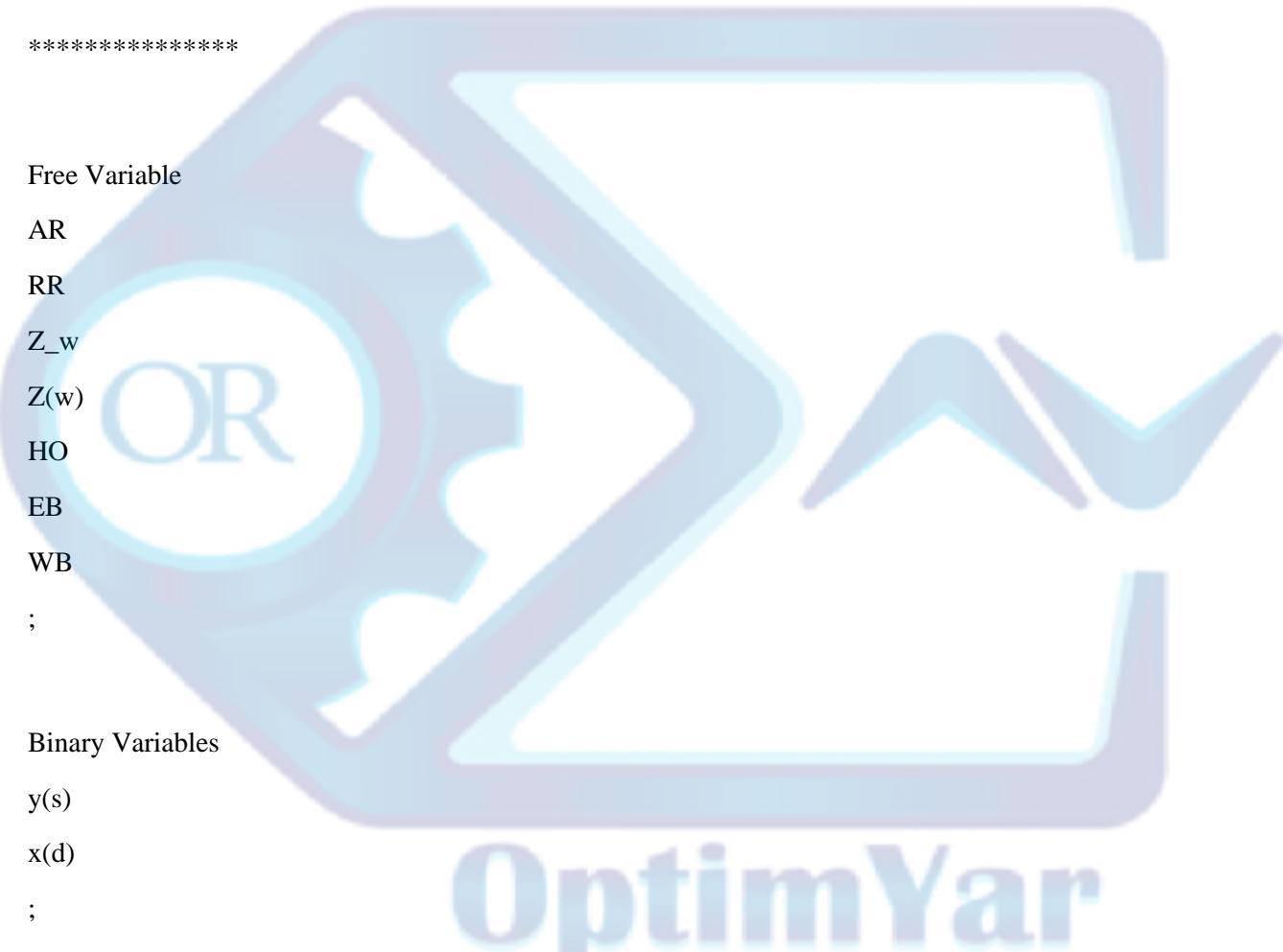
;

Binary Variables

y(s)

x(d)

;



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Positive Variable

u(s,w)

QSD(s,d,w)

QDC(d,c,w)

u_w(s)

```
QSD_w(s,d)  
QDC_w(d,c)  
;
```

Equations

obj_Hybrid

RR_Cal

obj_RNSSP

obj_RASSP

obj_Scenario

obj_w

cons1

cons2

cons3

cons4

cons5

cons1_w

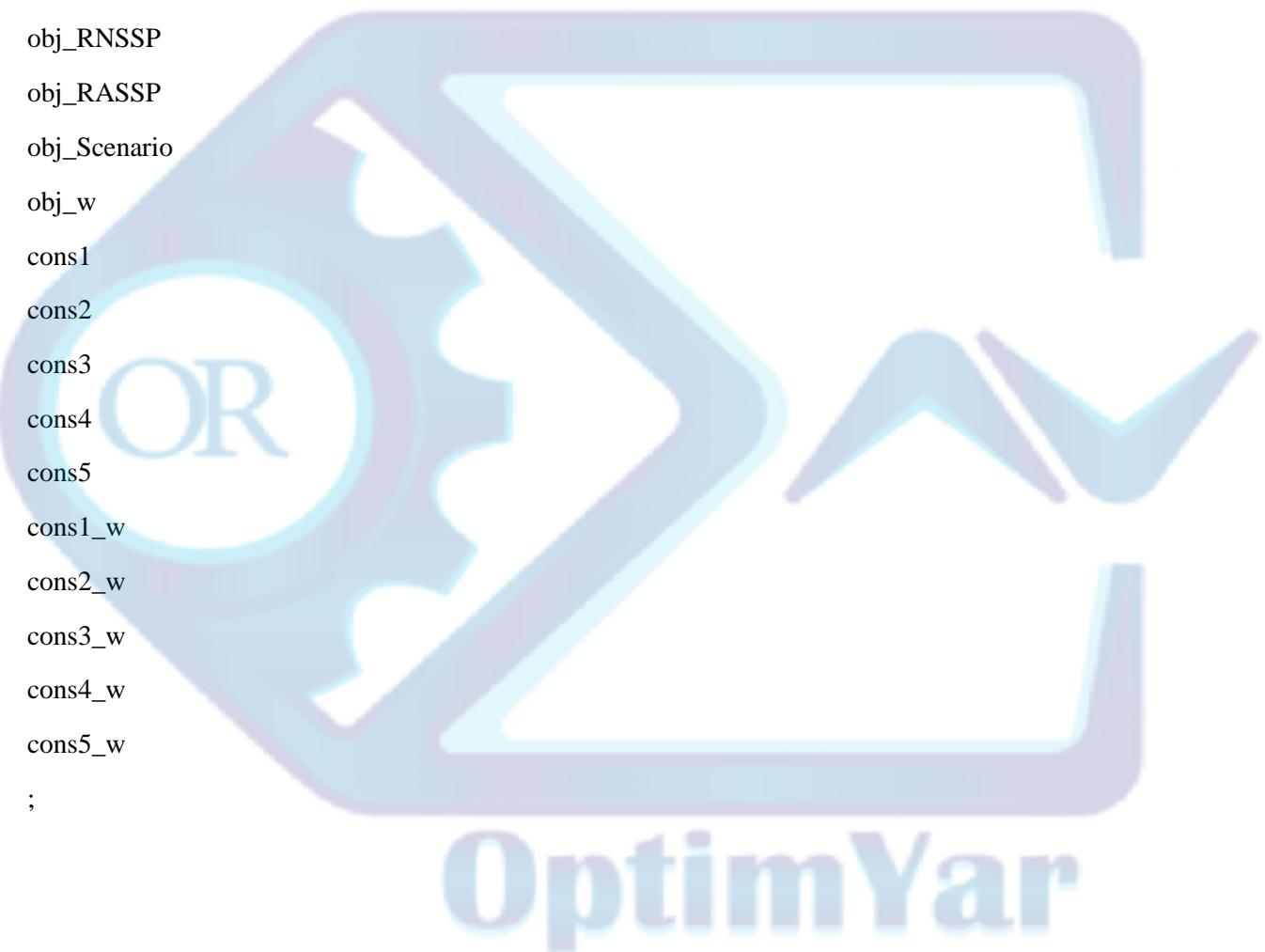
cons2_w

cons3_w

cons4_w

cons5_w

;



```
obj_w .. Z_w =e= p*sum({d,c},QDC_w(d,c)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) +  
sum({s,d},trSD(s,d)*QSD_w(s,d))  
+ sum({d,c},trDC(d,c)*QDC_w(d,c)) + sum(s,b(s)*u_w(s))) ;
```

cons1_w(s).. u_w(s) =L= capS(s)*y(s);

cons2_w(d).. sum(S,QSD_w(s,d))=L= capD(d)*x(d);

cons3_w(s).. u_w(s) =e= sum(d,QSD_w(s,d));

cons4_w(d).. sum(s,QSD_w(s,d)) =e= sum(c,QDC_w(d,c));

cons5_w(c).. sum(d,QDC_w(d,c)) =l= dem_w(c);

Model SCND_W

/

obj_w

cons1_w

cons2_w

cons3_w

cons4_w

cons5_w

/

;

Options

Optcr=0;

Parameters

ZS(w);

Loop(w,

dem_w(c)=dem(c,w) ;

Solve SCND_w us mip max Z_w;

ZS(w)= Z_w.l;

);

*end of loop

Display ZS;

Scalar Lamda /0.3/;

obj_Hybrid.. HO =e= Lamda*WB + (1-Lamda)*EB;

RR_Cal(w).. RR(w) =e= (ZS(w) - Z(w))/(abs(ZS(w)));

RR.up(w)=0.55;

obj_RNSSP.. EB =e= sum(w,Prob(w)*Z(w));

obj_RASSP(w).. WB =l= Z(w);

obj_Scenario(w) .. z(w) =e= p*sum({d,c},QDC(d,c,w)) - (sum(d,f(d)*x(d)) + sum(s,A(s)*y(s)) +
sum({s,d},trSD(s,d)*QSD(s,d,w))
+ sum({d,c},trDC(d,c)*QDC(d,c,w)) + sum(s,b(s)*u(s,w))) ;

cons1(s,w).. u(s,w) =L= capS(s)*y(s);

cons2(d,w).. sum(S,QSD(s,d,w))=L= capD(d)*x(d);

cons3(s,w).. u(s,w) =e= sum(d,QSD(s,d,w));

cons4(d,w).. sum(s,QSD(s,d,w)) =e= sum(c,QDC(d,c,w));

cons5(c,w).. sum(d,QDC(d,c,w)) =l= dem(c,w);

Model SCND

/

obj_Hybrid

RR_Cal

obj_RNSSP

obj_RASSP

obj_Scenario

cons1

cons2

cons3

cons4

cons5

/

;

Options

mip = CPLEX

reslim =100

optcr = 0

;

Solve SCND us mip max HO;

Display

RR.l

EB.l

WB.l

Z.l

y.l

x.l

QSD.l

QDC.l

;

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دوره جامع آنلاین بهینه‌سازی استوار و برنامه‌ریزی در شرایط عدمقطعیت همراه با کدنویسی در نرم‌افزار (GAMS)

Decision-Making under Uncertainty (Robust Optimization - Stochastic Programming - Fuzzy Programming)

مدرس:

دکتر علی پاپی (Ali Papi)

تخصص شاخص: بهینه‌سازی و تحقیق در عملیات، علم تحلیل داده، تکنیک‌های تجزیه و روش‌های حل دقیق، بهینه‌سازی استوار داده‌محور، هوش مجازی و الگوریتم‌های فرآبتكاری، نظریه بازی، بهینه‌سازی چندهدفه و تصمیم‌گیری چندمعیاره

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