

## LNS, Large Neighborhood Search, Aircraft Landing Problem application.

### One Runway Case

Airland1.txt , one runway

airland1.txt Run Ways 1 Stop Execution Find Best Solution

Airplanes Information

Colum...	Plane0	Plane1	Plane2	Plane3	Plane4	Plane5	Plane6	Plane7	Plane8	Plane9
Appear...	54	120	14	21	35	45	49	51	60	85
Ei	129	195	89	96	110	120	124	126	135	160
Ti	155	258	98	106	123	135	138	140	150	180
Li	559	744	510	521	555	576	577	573	591	657
Penalty ...	10	10	30	30	30	30	30	30	30	30
Penalty ...	10	10	30	30	30	30	30	30	30	30

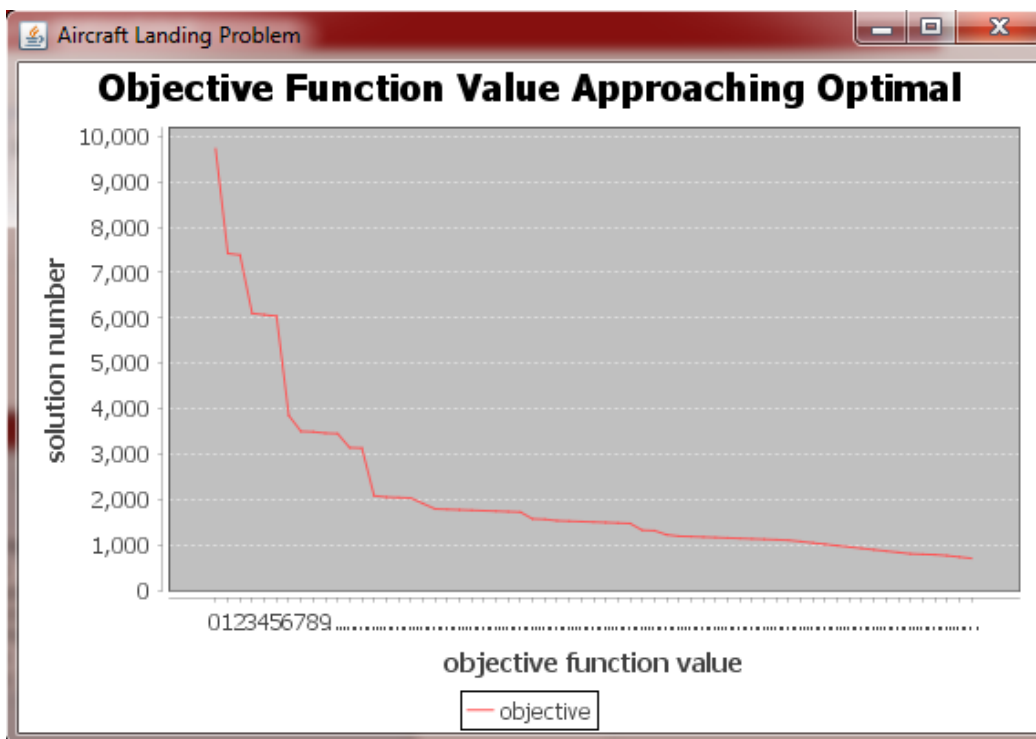
Separation Data

	Plane0	Plane1	Plane2	Plane3	Plane4	Plane5	Plane6	Plane7	Plane8	Plane9
plane0	99999	3	15	15	15	15	15	15	15	15
plane1	3	99999	15	15	15	15	15	15	15	15
plane2	15	15	99999	8	8	8	8	8	8	8
plane3	15	15	8	99999	8	8	8	8	8	8
plane4	15	15	8	8	99999	8	8	8	8	8

Best Solution Found :700

	Plane0	Plane1	Plane2	Plane3	Plane4	Plane5	Plane6	Plane7	Plane8	Plane9
Landin...	165	258	98	106	118	134	126	142	150	180
Runway	1	1	1	1	1	1	1	1	1	1

- Incomplete search - Unexpected interruption.  
Solver[Aircraft Landing Problem]  
Solutions: 63  
Minimize objective = 700,  
Building time : 0.167s  
Resolution time : 3.483s  
Nodes: 14,803 (4,250.6 n/s)  
Backtracks: 28,775  
Fails: 14,453



## Airland2.txt one runway case

airland2.txt Run Ways 1 Stop Execution Find Best Solution

Airplanes Information

Col...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...
App...	54	115	9	14	25	32	34	34	40	59	191	176	85	77	201
Ei	129	190	84	89	100	107	109	109	115	134	266	251	160	152	276
Ti	155	250	93	98	111	120	121	120	128	151	341	313	181	171	342
Li	559	732	501	509	536	552	550	544	557	610	837	778	674	637	815
Pen...	10	10	30	30	30	30	30	30	30	30	10	10	30	30	10
Pen...	10	10	30	30	30	30	30	30	30	30	10	10	30	30	10

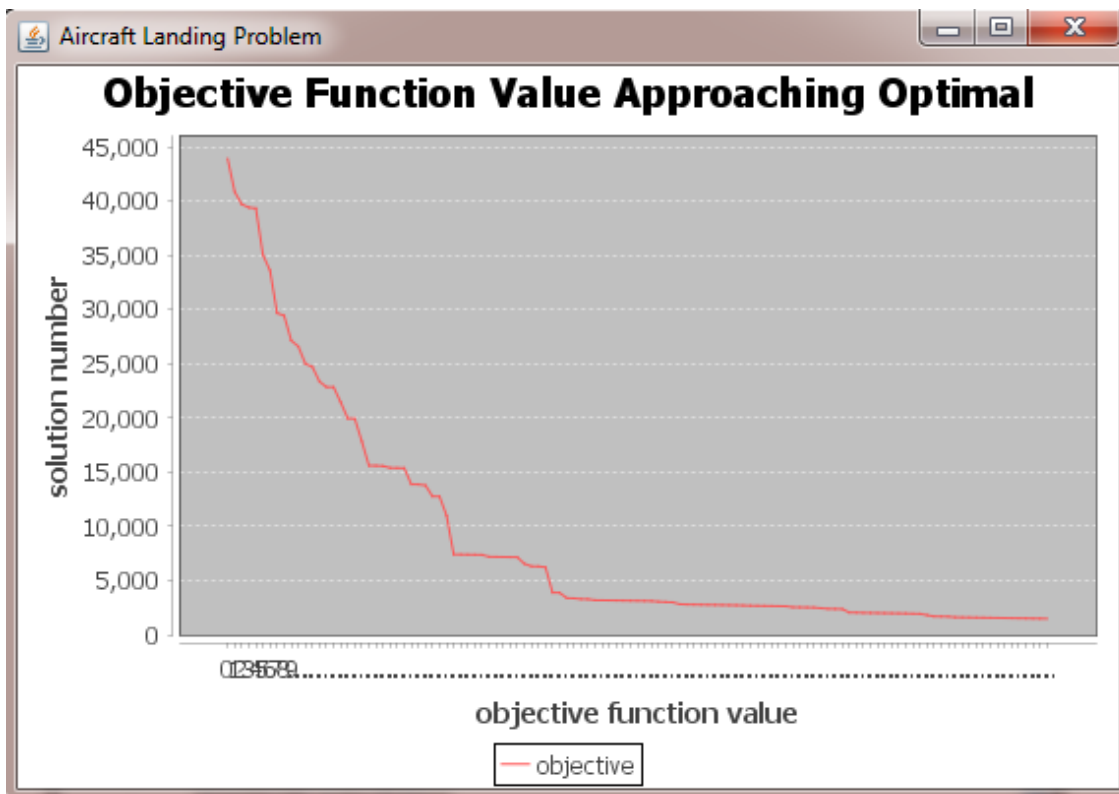
Separation Data

	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...
pla...	999...	3	15	15	15	15	15	15	15	15	3	3	15	15	3
pla...	3	999...	15	15	15	15	15	15	15	15	3	3	15	15	3
pla...	15	15	999...	8	8	8	8	8	8	8	15	15	8	8	15
pla...	15	15	8	999...	8	8	8	8	8	8	15	15	8	8	15
pla...	15	15	8	8	999...	8	8	8	8	8	15	15	8	8	15

Best Solution Found :1480

	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...	Pla...
Lan...	196	250	339	313	342	90	98	106	114	122	130	138	151	181	171
Run...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

- Incomplete search - Unexpected interruption.  
 Solver[Aircraft Landing Problem]  
 Solutions: 117  
 Minimize objective = 1480,  
 Building time : 0.182s  
 Resolution time : 35.482s  
 Nodes: 740,613 (20,872.8 n/s)  
 Backtracks: 1,475,302  
 Fails: 735,819



### Airland3.txt one runway

airland3.txt

Run Ways 

1

Stop Execution

Find Best Solution

Airplanes Information

C...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...
A...	0	82	59	28	126	20	110	23	42	42	57	39	186	175	139	235	194	162	69	76
Ei	75	157	134	103	201	95	185	98	117	117	132	114	261	250	214	310	269	237	144	151
Ti	82	197	160	117	261	106	229	108	132	130	149	126	336	316	258	409	338	287	160	169
Li	486	628	561	565	735	524	664	523	578	569	615	551	834	790	688	967	818	726	607	624
P...	30	10	10	30	10	30	10	30	30	30	30	30	10	10	10	10	10	10	30	30
P...	30	10	10	30	10	30	10	30	30	30	30	30	10	10	10	10	10	10	30	30

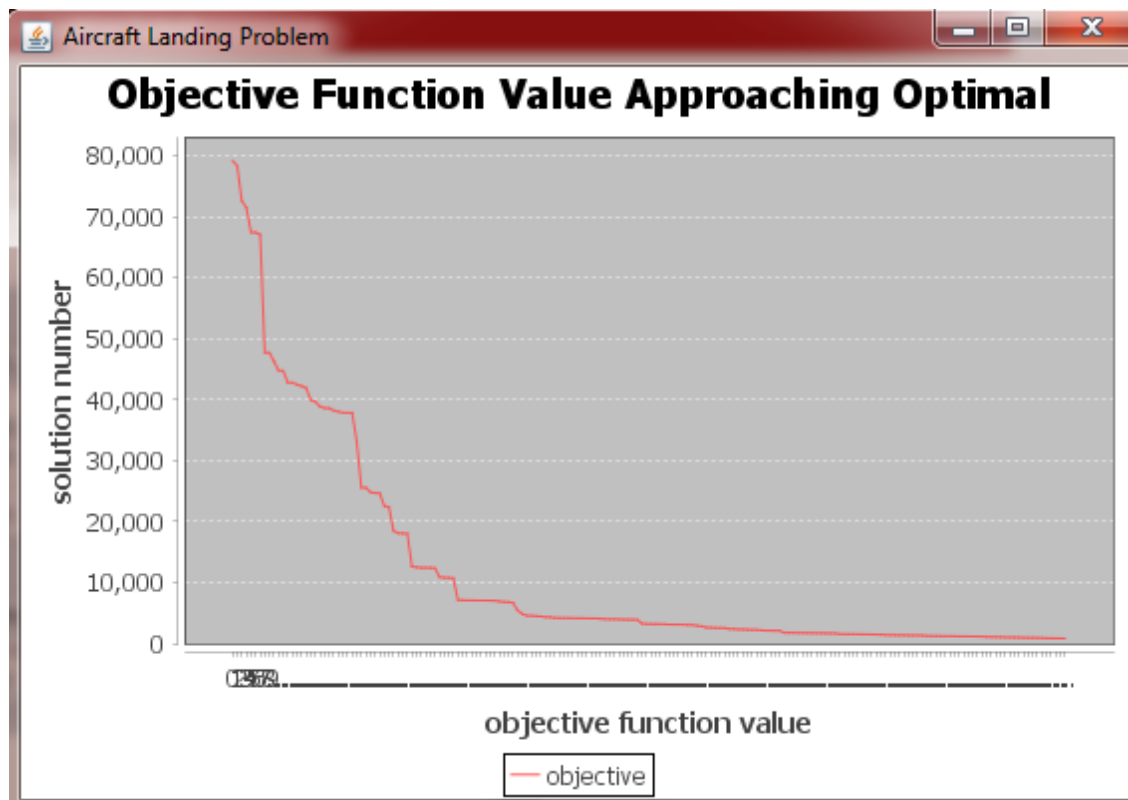
Separation Data

	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...
pl...	9...	15	15	8	15	8	15	8	8	8	8	8	15	15	15	15	15	8	8	
pl...	15	9...	3	15	3	15	3	15	15	15	15	15	3	3	3	3	3	15	15	
pl...	15	3	9...	15	3	15	3	15	15	15	15	15	3	3	3	3	3	15	15	
pl...	8	15	15	9...	15	8	15	8	8	8	8	8	15	15	15	15	15	8	8	
pl...	15	3	3	15	9...	15	3	15	15	15	15	15	3	3	3	3	3	15	15	

Best Solution Found :820

	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...
L...	197	184	261	229	336	316	258	409	339	287	82	117	100	108	133	141	149	125	160	169
R...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

- Incomplete search - Unexpected interruption.  
 Solver[Aircraft Landing Problem]  
 Solutions: 182  
 Minimize objective = 820,  
 Building time : 0.210s  
 Resolution time : 131.087s  
 Nodes: 2,234,047 (17,042.5 n/s)  
 Backtracks: 4,435,533  
 Fails: 2,208,004



## Airland4.txt one runway

airland4.txt Run Ways 1 LNS search method RLNS Stop Execution Find Best Solution

Airplanes Information

Co...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...
Ap...	7	9	75	129	14	29	30	30	26	146	157	63	48	160	78	65	76	76	75	211
Ei	82	84	150	204	89	104	105	105	101	221	232	138	123	235	153	140	151	151	150	286
Ti	92	93	183	270	98	117	118	116	112	280	295	156	137	291	174	156	170	169	168	357
Li	510	509	599	760	510	552	550	542	528	742	766	630	573	746	663	609	642	634	627	840
Pe...	30	30	10	10	30	30	30	30	30	10	10	30	30	10	30	30	30	30	30	10
Pe...	30	30	10	10	30	30	30	30	30	10	10	30	30	10	30	30	30	30	30	10

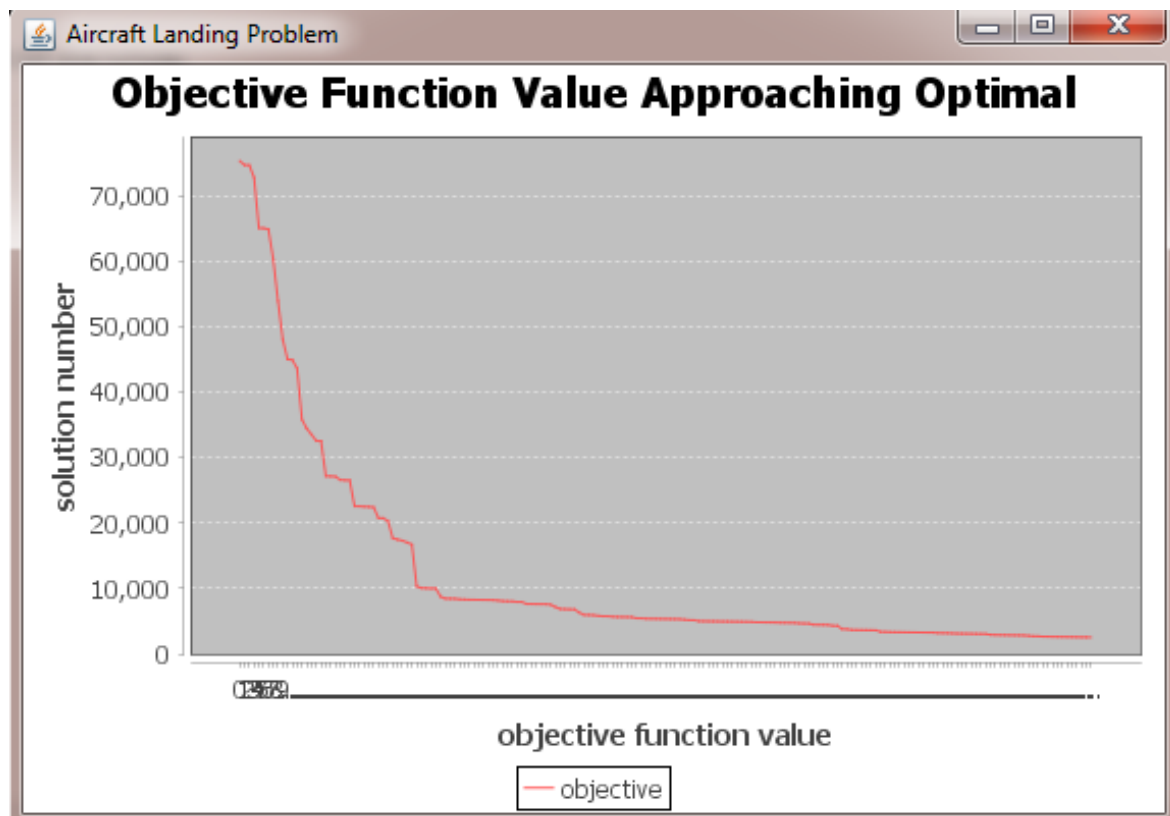
Separation Data

	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...
pl...	99...	8	15	15	8	8	8	8	8	15	15	8	8	15	8	8	8	8	8	15
pl...	8	99...	15	15	8	8	8	8	8	15	15	8	8	15	8	8	8	8	8	15
pl...	15	15	99...	3	15	15	15	15	15	3	3	15	15	3	15	15	15	15	15	3
pl...	15	15	3	99...	15	15	15	15	15	3	3	15	15	3	15	15	15	15	15	3
pl...	8	8	15	15	99...	8	8	8	8	15	15	8	8	15	8	8	8	8	8	15

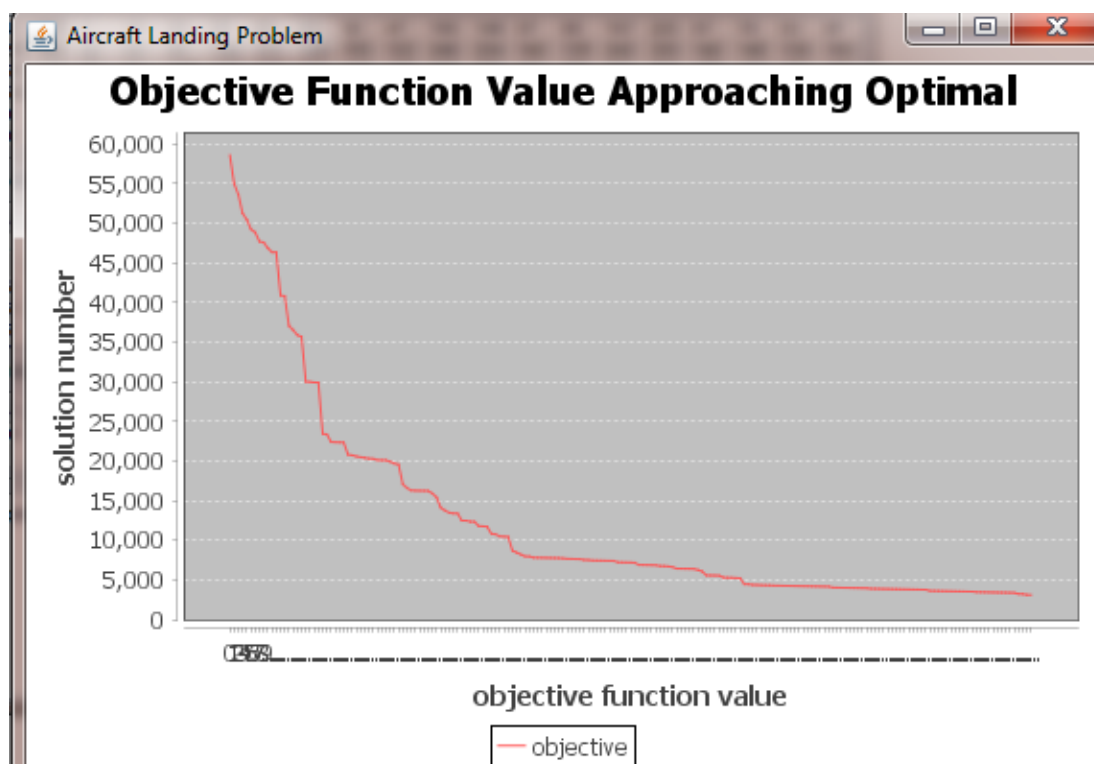
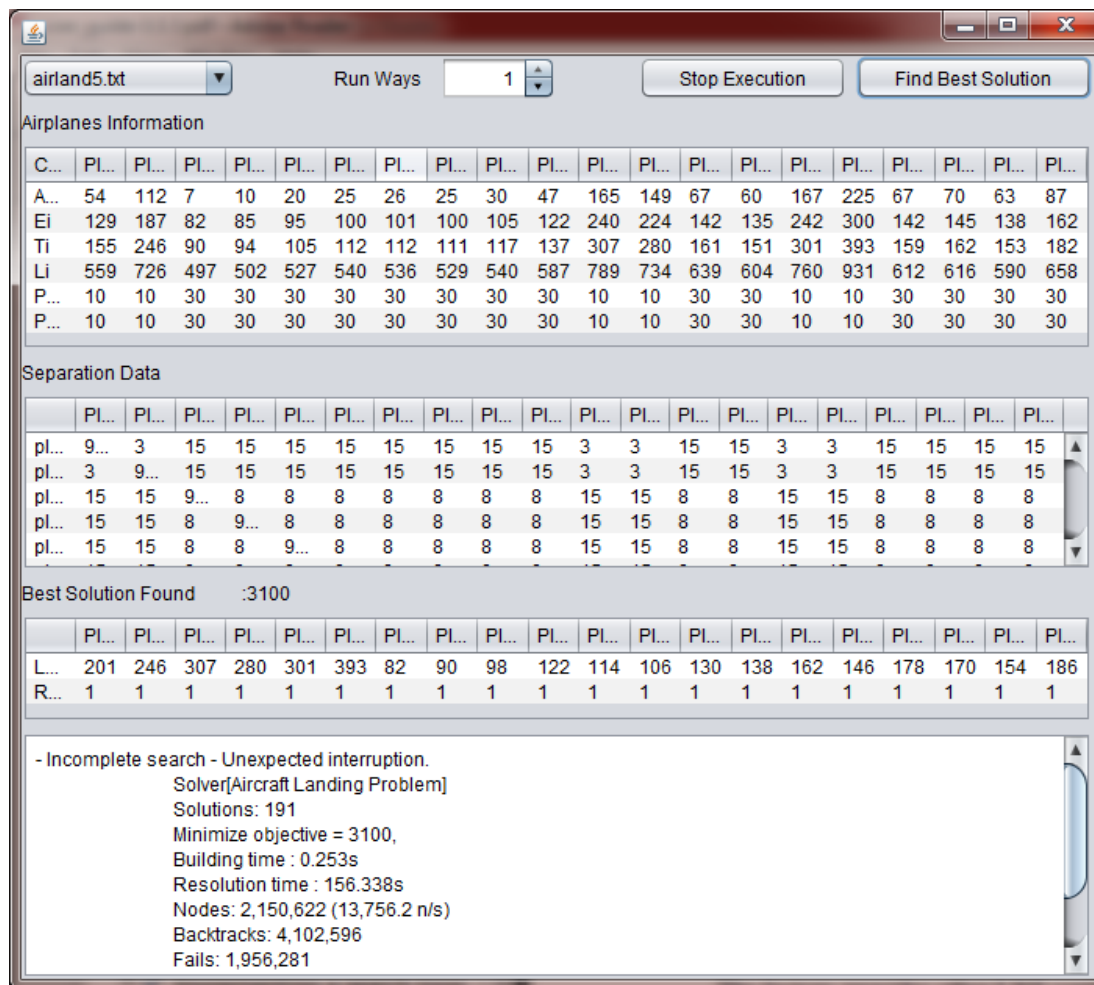
Best Solution Found :2520

	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...	PI...
La...	201	270	280	295	291	357	82	90	98	122	130	114	106	154	138	178	146	170	186	162
Ru...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

- Incomplete search - Unexpected interruption.  
 Solver[Aircraft Landing Problem]  
 Solutions: 179  
 Minimize objective = 2520,  
 Building time : 0.256s  
 Resolution time : 173.284s  
 Nodes: 3,403,712 (19,642.4 n/s)  
 Backtracks: 6,717,527  
 Fails: 3,321,394



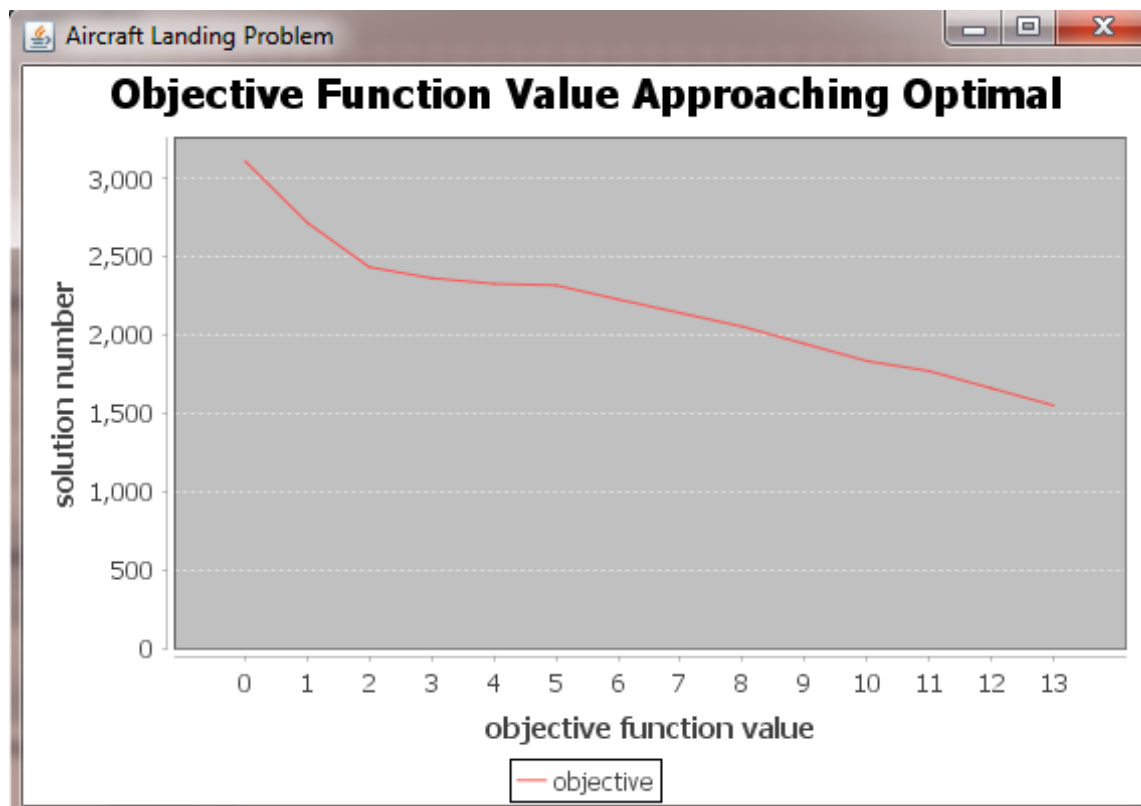
Airland5.txt one runway



### Airland6.txt one runway

[illegible]

One iteration to optimal.

[illegible]

Airline8.txt one runway.

