
طراحی مدل مدیریت درآمد در شرکت‌های حمل و نقل عمومی:
موردکاوی قطار غزال تهران - مشهد

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EMSR-b

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Ultimate Super Saver Fares

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$$b_j = C - y_{j-1} \quad j = 2, \dots, n \quad ()$$

n

n

: j

: C

: b

: y

« EMSR-b »

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(Static)



$$V_j(x)$$

$$(j \quad x) D_j \quad (\quad) u$$

$$r_j$$

$$r_j u + V_{j-1}(x - u)$$

$$\text{Consr: } 0 \leq u \leq \min\{D_j, x\} \quad ()$$

$$j \quad ()$$

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Dj

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$$\begin{aligned}
 & (y_j) \\
 & [1] \quad () \\
 & S_i = \sum_{k=1}^j D_k \quad () \\
 & \quad \quad \quad 1, \dots, j \\
 & R_j = \frac{\sum_{k=1}^j r_k E[D_k]}{\sum_{k=1}^j E[D_k]} \quad () \\
 & \quad \quad \quad j \quad E[D_j] \\
 & \quad \quad \quad y_j \quad j \\
 & P(S_i > y_j) = \frac{r_{j+1}}{R_j} \quad () \\
 & V_j(x) = E \left[\max_{0 \leq u \leq \min\{D_j, x\}} \{r_j u + V_{j-1}(x-u)\} \right] \quad () \\
 & V_{n+1}(x) = 0, \quad x = 0, 1, \dots, C \\
 & \Delta V_j(x) = V_j(x) - V_j(x-1) \quad () \\
 & \quad \quad \quad \Delta V_j(x) \\
 & \quad \quad \quad x \\
 & \quad \quad \quad j \\
 & \quad \quad \quad V_j(x) \quad \Delta V_j(x) \\
 & (i) \quad \Delta V_j(x+1) \leq \Delta V_j(x) \quad V_{x,j} \quad () \\
 & (ii) \quad \Delta V_{j+1}(x) \geq \Delta V_j(x) \quad V_{x,j} \\
 & \quad \quad \quad x \\
 & \quad \quad \quad [] \\
 & \quad \quad \quad [] \\
 & \quad \quad \quad b \\
 & \quad \quad \quad j+1
 \end{aligned}$$

Different price of original price	price	Class name
		Ghazal
		Delijan
		Lux

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ESMR-b

Input Analyzer Arena v.7.1

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EMSR-b

$N(\mu, \delta)$

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- ()

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C^* () ()

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Y_i

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Lux	Delijan	Ghazal
Distribution: Normal Expression: NORM (431, 20.5) Square Error = 0.028015	Distribution: Normal Expression: NORM (438, 68.1) Square Error = 0.061999	Distribution: Normal Expression: NORM (321, 55.5) Square Error = 0.379287
Chi Square Test Number of intervals = 26 Degrees of freedom = 23 Test Statistic = 678 Corresponding p-value < 0.005	Chi Square Test Number of intervals = 5 Degrees of freedom = 2 Test Statistic = 18 Corresponding p-value < 0.005	Chi Square Test Number of intervals = 13 Degrees of freedom = 10 Test Statistic = 1.18e+003 Corresponding p-value < 0.005
Data Summary Number of Data Points = 348 Min Data Value = 399 Max Data Value = 497 Sample Mean = 431 Sample STD Dev = 20.5	Kolmogorov-Smirnov Test Test Statistic = 0.195 Corresponding p-value = 0.043	Kolmogorov-Smirnov Test Test Statistic = 0.34 Corresponding p-value < 0.01
	Data Summary Number of Data Points = 49 Min Data Value = 283 Max Data Value = 516 Sample Mean = 438 Sample STD Dev = 68.8	Data Summary Number of Data Points = 305 Min Data Value = 149 Max Data Value = 416 Sample Mean = 321 Sample STD Dev = 55.6

ESMR-b

Lux	Delijan	Ghazal	name
.	140	456	C^*
.	۱۴۰	۴۵۶	Y_i

Matlab

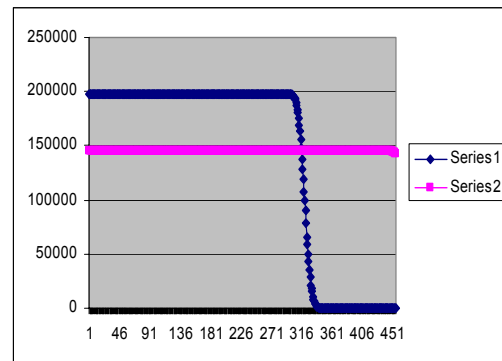
v.7

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MATLAB



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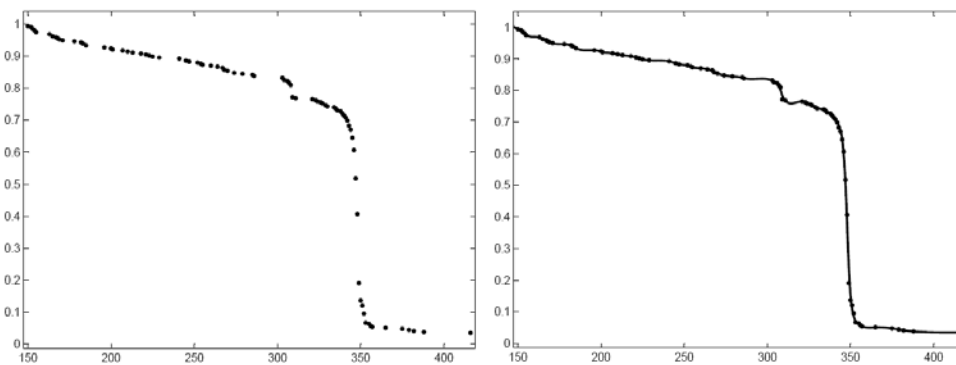
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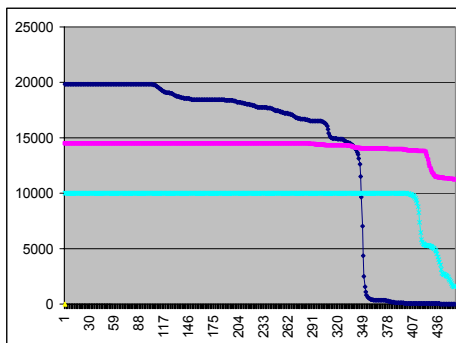
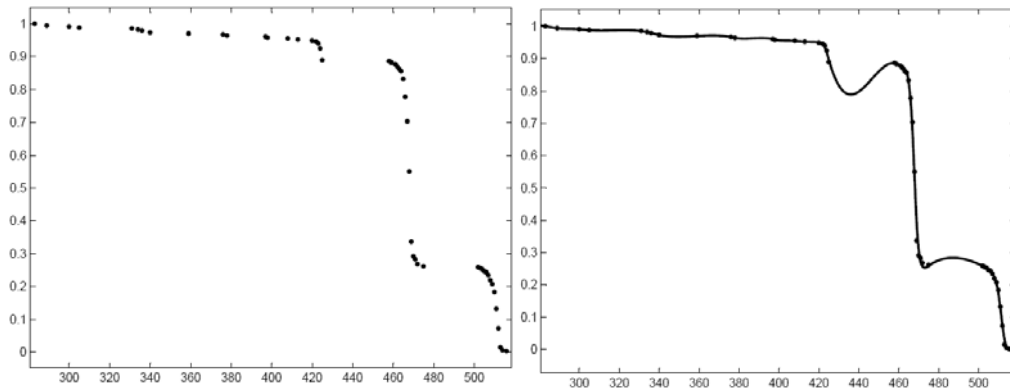
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MATLAB

probability	No. of event	All passengers	probability	No. of event	All passengers	probability	No. of event	All passengers
0.739683	233	334	0.885714	279	245	1	315	149
0.736508	232	335	0.88254	278	247	0.993650794	313	150
0.730159	230	336	0.879365	277	252	0.99047619	312	152
0.726984	229	338	0.87619	276	254	0.984126984	310	153
0.720635	227	339	0.873016	275	255	0.980952381	309	154
0.714286	225	340	0.869841	274	260	0.974603175	307	155
0.707937	223	341	0.866667	273	264	0.968253968	305	163
0.698413	220	342	0.863492	272	267	0.961904762	303	165
0.68254	215	343	0.857143	270	268	0.958730159	302	167
0.669841	211	344	0.853968	269	270	0.955555556	301	168
0.644444	203	345	0.847619	267	274	0.952380952	300	169
0.606349	191	346	0.844444	266	279	0.949206349	299	171
0.51746	163	347	0.84127	265	285	0.946031746	298	178
0.406349	128	348	0.838095	264	286	0.942857143	297	182
0.190476	60	349	0.831746	262	303	0.93968254	296	183
0.136508	43	350	0.825397	260	304	0.933333333	294	185
0.120635	38	351	0.822222	259	306	0.926984127	292	196
0.095238	30	352	0.815873	257	307	0.923809524	291	200
0.066667	21	353	0.809524	255	308	0.920634921	290	201
0.063492	20	355	0.771429	243	309	0.917460317	289	207
0.057143	18	356	0.768254	242	311	0.914285714	288	210
0.053968	17	357	0.765079	241	321	0.911111111	287	213
0.050794	16	365	0.761905	240	323	0.907936508	286	218
0.047619	15	375	0.75873	239	324	0.904761905	285	221
0.044444	14	379	0.755556	238	326	0.901587302	284	223
0.04127	13	382	0.752381	237	327	0.898412698	283	225
0.038095	12	388	0.746032	235	329	0.895238095	282	229
0.034921	11	416	0.742857	234	330	0.892063492	281	241



probability	No. of event	All passengers	probability	No. of event	All passengers	probability	No. of event	All passengers
0.267267	89	472	0.93994	313	423	1	333	283
0.261261	87	475	0.924925	308	424	0.993993994	331	289
0.258258	86	502	0.888889	296	425	0.990990991	330	300
0.255255	85	503	0.885886	295	458	0.987987988	329	305
0.252252	84	504	0.882883	294	459	0.984984985	328	331
0.246246	82	505	0.876877	292	461	0.981981982	327	334
0.243243	81	506	0.870871	290	462	0.978978979	326	336
0.234234	78	507	0.861862	287	463	0.972972973	324	340
0.219219	73	508	0.855856	285	464	0.96996997	323	359
0.207207	69	509	0.831832	277	465	0.966966967	322	376
0.183183	61	510	0.777778	259	466	0.963963964	321	378
0.132132	44	511	0.702703	234	467	0.960960961	320	397
0.072072	24	512	0.54955	183	468	0.957957958	319	398
0.015015	5	513	0.336336	112	469	0.954954955	318	408
0.006006	2	514	0.291291	97	470	0.951951952	317	413
0.003003	1	516	0.282282	94	471	0.948948949	316	420
						0.945945946	315	422



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Number of sell	Class name
Ghazal	439
Delijan	117
Lux	0

VBA

Excel

VB

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Time of study	// - //
Revenue of period(IRR)	
Max daily revenue (IRR)	
Min daily revenue (IRR)	
Average daily revenue (IRR)	

Average random generation	simulation process
۰.۵۰۰۱۱۴	b-EMSR
۰.۵۰۰۰۳۴	Static Multiple Class

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No.of sold seats in Ghazal class	Revenue of Ghazal class	No. of sold seats in Delijan class	Revenue of Delijan class	Average of total sold seats	Average daily revenue (IRR)	metod
314.5184	62274640	140	2030000	454.5184	82574640	EMSR-b
311.1462	61606950	104.4029	15138420	415.5491	76745370	Static Multiple Class

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Average revenue for 353 days(IRR)	Average daily revenue (IRR)	Min daily revenue (IRR)	Max daily revenue (IRR)	No.of simulation	metod
29148847920	82574640	81482000	82868000		EMSR-b
27091115610	76745370	72606000	80498000		Static Multiple Class

EMSR-b

EMSR-b

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1- Revenue Management
 3- American Airlines
 5 - Belobaba
 7- Vardi
 9 - Stone
 11- Sanchez
 13- Chatwin
 15- Static Multiple Class

2- People Express
 4- Dynamic Inventory Allocation and Maintenance Optimizer
 6- Shlifer
 8- Thompson
 10- Martinez
 12- Little wood
 14- Excepted Marginal Seat Revenue
 16- Bellman