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Air Transhare System (ATS)

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Content

- Issue
- Objective
- Application
- Case Study
- Demo
- Prospect

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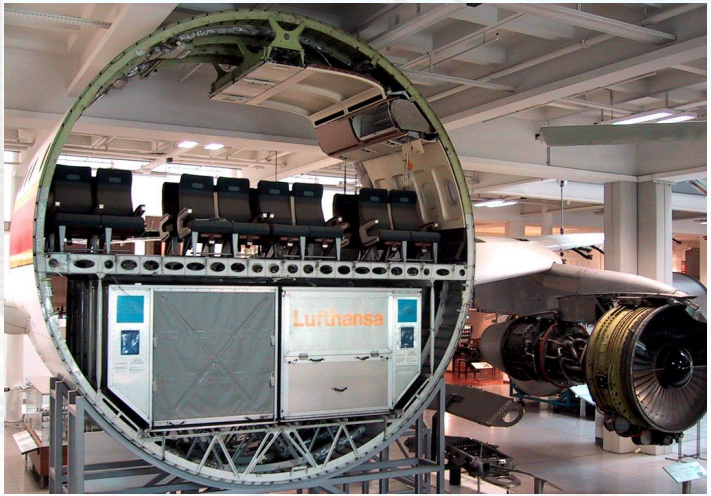
Issue

When the passenger flight is not fully booked, the reserve of the baggage allowance would be a wastage of resources.



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Objectives

- Reduce delivery time
- Lessen transportation cost
- Expand opportunities
- Ameliorate Air Transportation System
- Consume fewer resources

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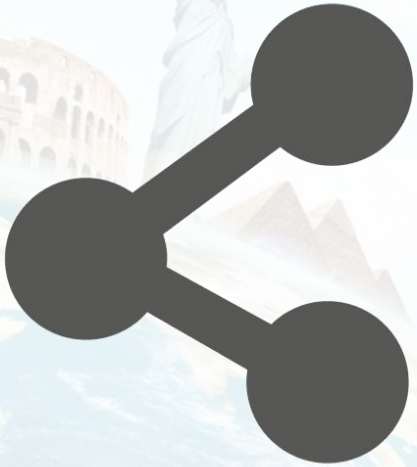
Air Transhare System

Transhare is compounded by “transport” and “share”, that is an idea of sharing Air Transport Resources between different Airline.



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Application

- Channel different airlines and to joint their air transport resources.
- Provide a platform for the small customer to make good use of the vacancy.

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Application

- Feedback will be collected from users through survey, and discount would be given to the participants for the next purchase.

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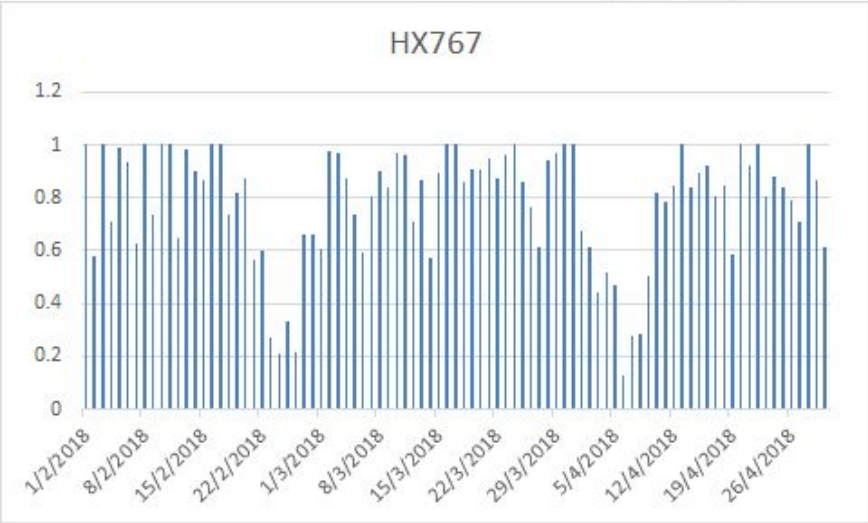
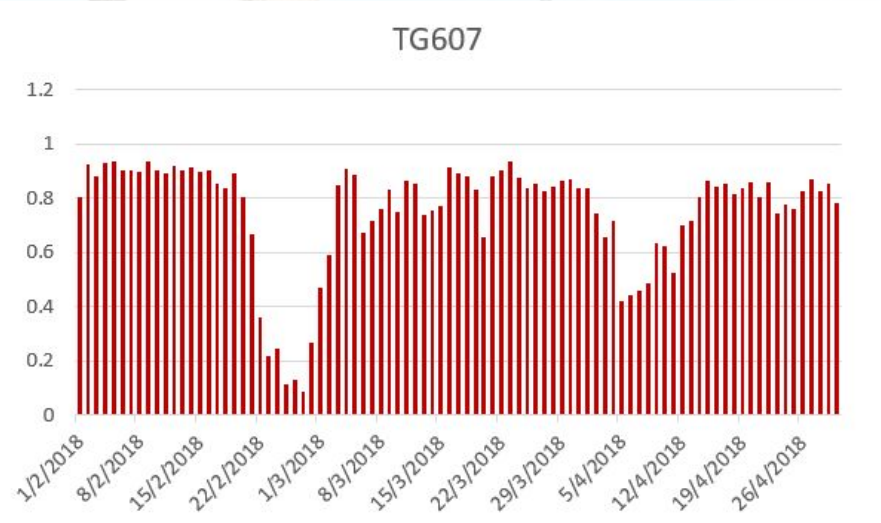
Case Study

Hong Kong → Bangkok

HONGKONG AIRLINES 香港航空

THAI





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Case Study

Assume there was a business opportunity on 2rd March 2018 for the Hong Kong Airlines (HX767), which demand for 10% of its capacity.

In this case, Hong Kong Airlines was not able to pick up this business unless they held a special flight.

Date	HX767_N	HX767_P	TG607_N	TG607_P
28/2/2018	198	0.662207	104	0.261307
1/3/2018	181	0.605351	186	0.467337
2/3/2018	291	0.973244	234	0.58794
3/3/2018	290	0.9699	337	0.846734
4/3/2018	261	0.87291	360	0.904523
5/3/2018	221	0.73913	352	0.884422
14/3/2018	170	0.568562	300	0.753769

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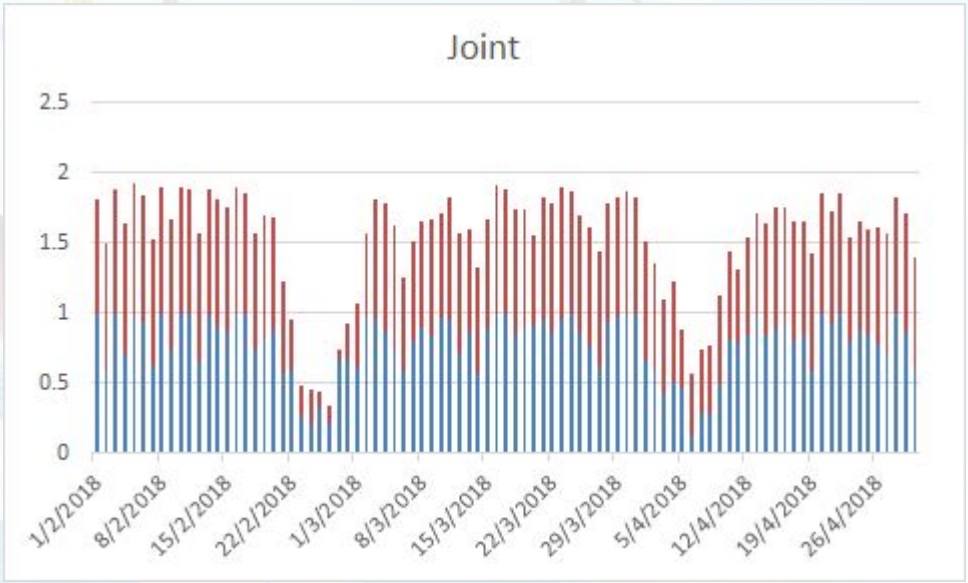
Case Study

However, if there was ATS, Hong Kong Airlines could pick up the opportunity by using the vacancy from Thai Airways, and vice versa.



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Input Data

- Boarding Pass
- Flight Number
- Seating capacity

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Can we estimate the Occupancy Rate ?

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Background

Route: Hong Kong (HKG) to ChangSha (CSX)
Flight No: KA720
Data Duration: 1st February 2018 - 30th April 2018

Target variable Y: Occupancy Rate

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Feature Selection

Method: multiple linear regression

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_k x_k + \epsilon.$$

OLS Regression Results

Dep. Variable:	Percentage	R-squared:	0.560
Model:	OLS	Adj. R-squared:	0.283
Method:	Least Squares	F-statistic:	2.021
Date:	Sat, 13 Oct 2018	Prob (F-statistic):	0.0101
Time:	21:28:14	Log-Likelihood:	72.867
No. Observations:	89	AIC:	-75.73
Df Residuals:	54	BIC:	11.37
Df Model:	34		
Covariance Type:	nonrobust		

- R-squared measures the strength of the relationship between the model and the dependent variable on a convenient 0 – 100% scale

Result

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	coef	std err	t	P>|t|	[0.025	0.975]
const	0.7524	0.062	12.108	0.000	0.628	0.877
Public_Holiday	-0.1469	0.056	-2.601	0.012	-0.260	-0.034
Mon	0.1045	0.043	2.451	0.018	0.019	0.190
Tue	0.1120	0.046	2.456	0.017	0.021	0.203
Wed	0.1208	0.046	2.638	0.011	0.029	0.213
Thu	0.1157	0.046	2.521	0.015	0.024	0.208
Fri	0.0851	0.044	1.930	0.059	-0.003	0.174
Sat	0.0066	0.045	0.148	0.883	-0.084	0.097
Sun	0.2077	0.041	5.012	0.000	0.125	0.291
TodayTemperMin	0.0014	0.012	0.118	0.907	-0.023	0.026
TodayTemperMax	-0.0029	0.008	-0.373	0.711	-0.018	0.012
TomorrowTemperMin	0.0036	0.010	0.376	0.708	-0.016	0.023
TomorrowTemperMax	-0.0045	0.007	-0.661	0.511	-0.018	0.009
Clear	0.1144	0.069	1.654	0.104	-0.024	0.253
Cloudy	0.1139	0.038	2.992	0.004	0.038	0.190
Cloudy turn to fine	0.0859	0.087	0.990	0.327	-0.088	0.260

- changes in the predictor's value(X) are related to changes in the response variable

Result

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	coef	std err	t	P>|t|	[0.025	0.975]
Cloudy turn to fine	0.0859	0.087	0.990	0.327	-0.088	0.260
Cloudy turn to light rain	0.1298	0.081	1.593	0.117	-0.034	0.293
Cloudy turn to showers	0.0124	0.077	0.160	0.873	-0.143	0.167
Cloudy turn to thundershower	-0.0192	0.114	-0.168	0.867	-0.248	0.210
Heavy rain turn to light rain	0.1762	0.142	1.245	0.218	-0.108	0.460
Light rain	0.2283	0.082	2.771	0.008	0.063	0.393
Light rain turn cloudy	0.0839	0.099	0.843	0.403	-0.116	0.283
Light rain turn to cloudy	-0.0480	0.107	-0.449	0.655	-0.262	0.166
Light rain turn to rain	0.0832	0.078	1.065	0.292	-0.073	0.240
Rain turn to rainstorm	0.1284	0.156	0.821	0.415	-0.185	0.442
Rain turn to showers	0.0100	0.106	0.094	0.925	-0.202	0.222
Shower turns to cloudy	-0.2397	0.113	-2.116	0.039	-0.467	-0.013
Showers	-0.0317	0.067	-0.475	0.637	-0.165	0.102
Showers turn to light rain	-0.1460	0.141	-1.034	0.306	-0.429	0.137
Sunny turn to cloudy	0.1391	0.072	1.937	0.058	-0.005	0.283
The showers trun to thundershower	0.0259	0.152	0.170	0.865	-0.279	0.330
The thundershower turn to cloudy	0.2120	0.152	1.392	0.170	-0.093	0.517
The thundershower turn to rain	-0.2535	0.143	-1.776	0.081	-0.540	0.033

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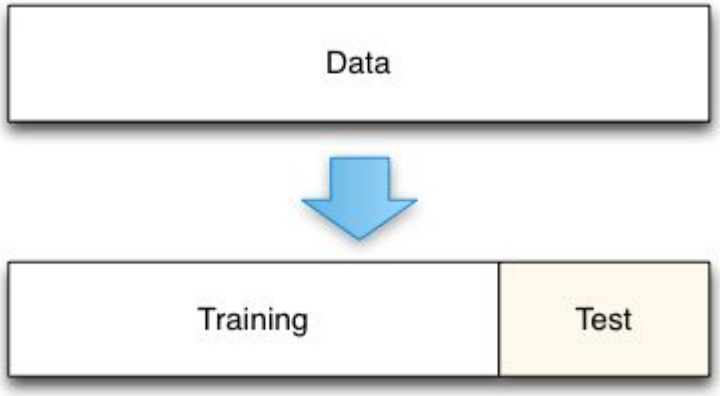
Model: Logistic Regression

- If occupancy rate > 70% → 1
- Otherwise (occupancy rate < 70%) → 0
- Training data: 80% vs Testing data: 20%



	Variable		Variable
1	Public Holiday	6	Sun
2	Mon	7	Cloudy turn to light rain
3	Tue	8	Light rain
4	Wed	9	Shower turns to cloudy
5	Thu		

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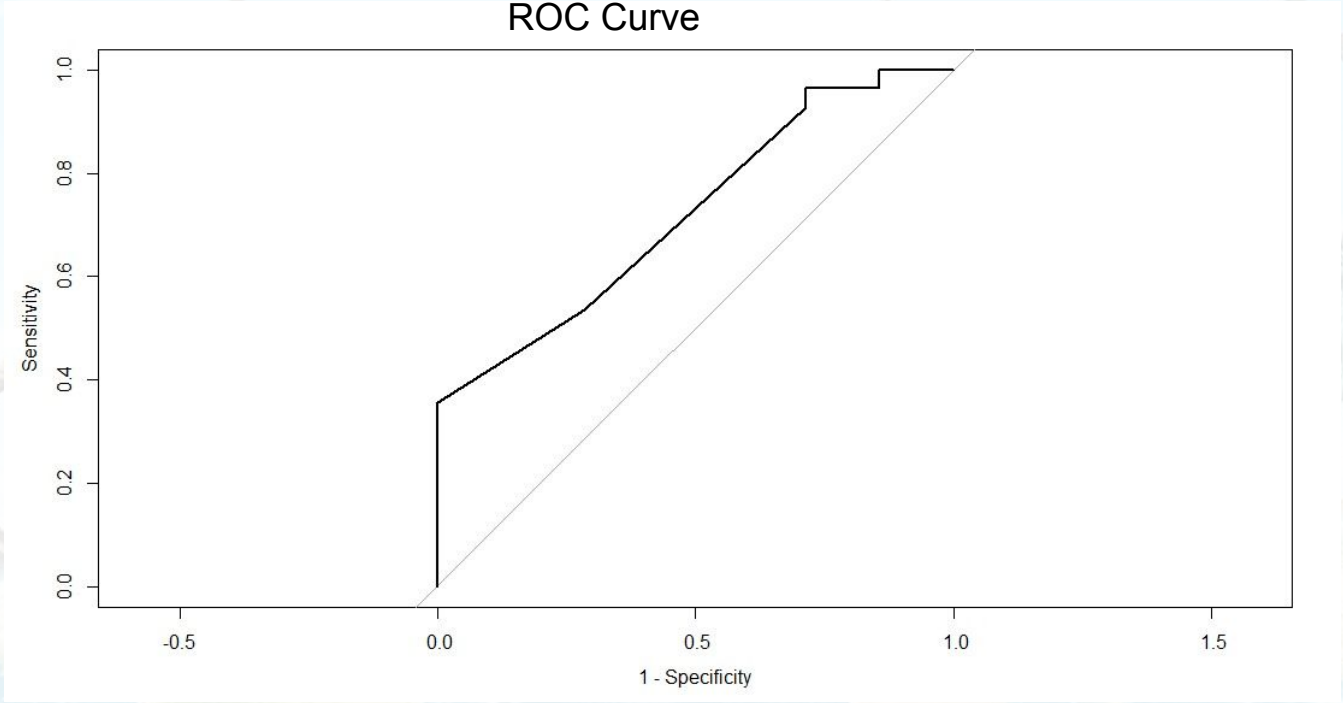
Model: Logistic Regression



The Area Under Curve: 72.29% (accuracy)

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Prospect

- Rating system
  - Correspond to the feedbacks
  - Accuracy
- Sorting System
  - Direct/Transit
    - Customers may separate their goods at transit depot
  - Airlines
  - Accuracy
    - Estimate the chance of delay by machine learning


thank you!