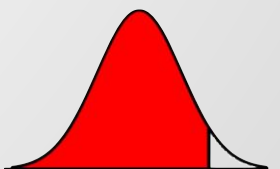# Predicting Rental Prices with Machine Learning:Insights and Applications

Hung-Cheng Chang, 張宏正(Jack)

Outline

1. Motivation

2. Flow Chart

3. Data

4. Method

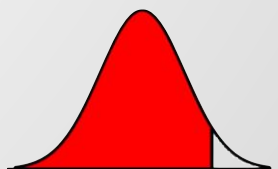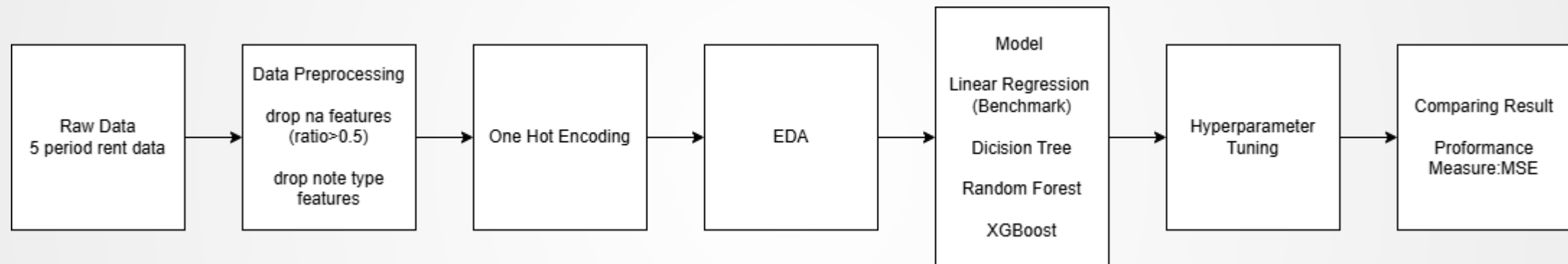5. Result

Motivation

⊡ In recent years, the housing issue in Taiwan has become a hot topic, which has led to a sharp rise in housing prices.

⊡ Rent plays an important role in the housing market, directly reflecting the supply and demand relationship.

⊡ It is hoped that the model can serve as a benchmark for both landlords and tenants in deciding rental prices.
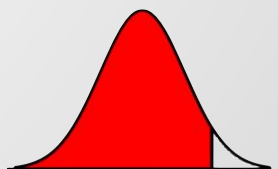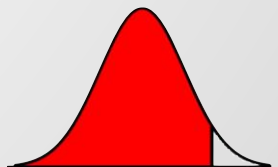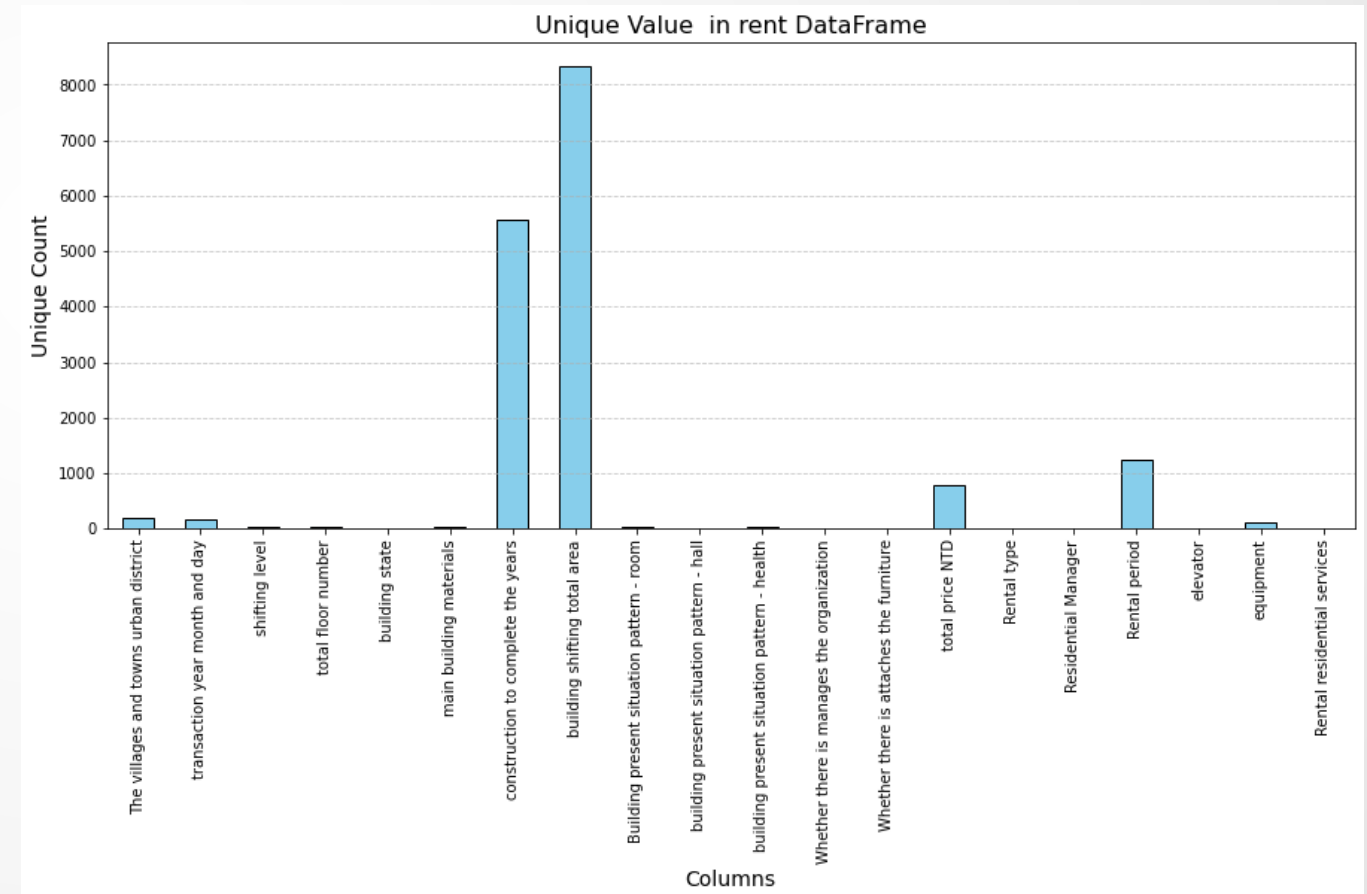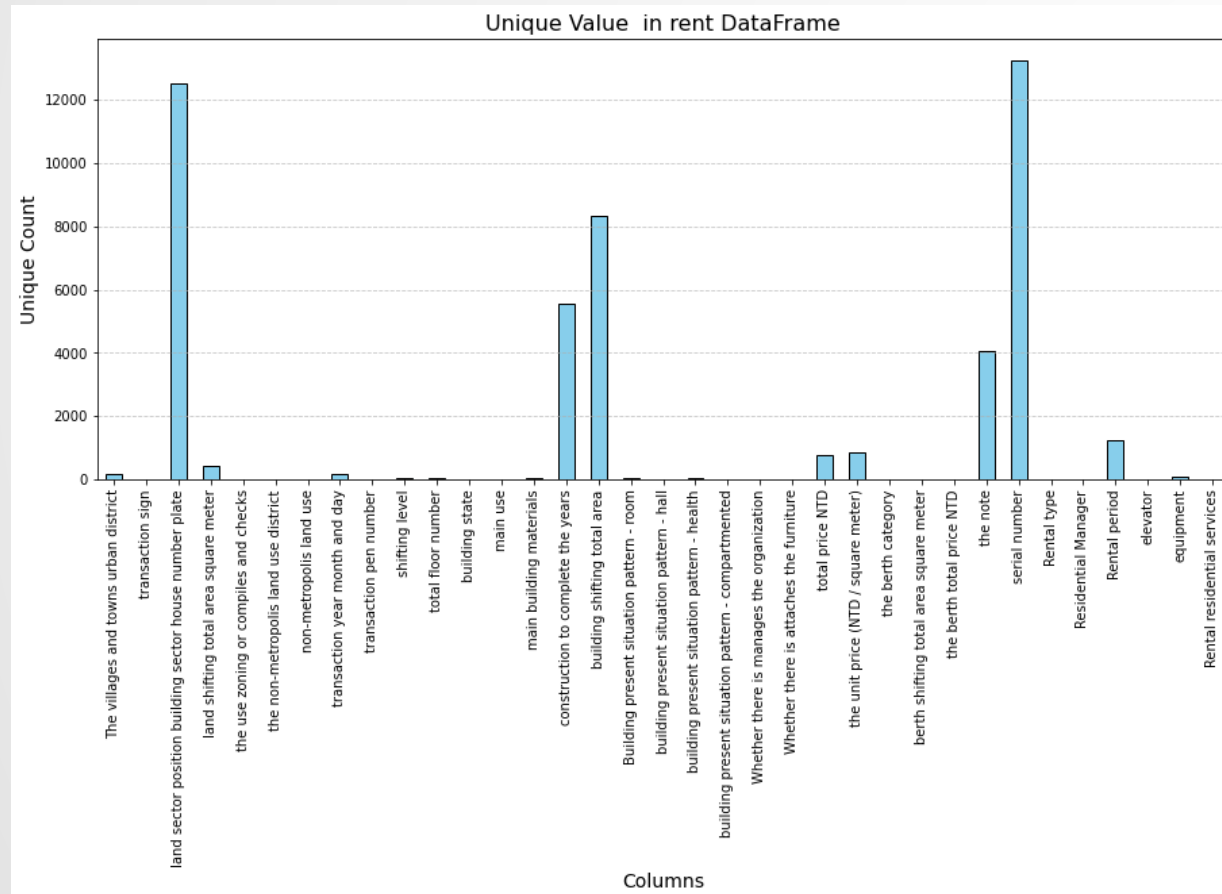
Flow Chart

Data

⊡ Source:不動產成交案件(Dept of Land Administration M. O. I.)

⊡ Release Date:240811~240921(Total 5 periods)

⊡ Size:n=36498, p=35

Data
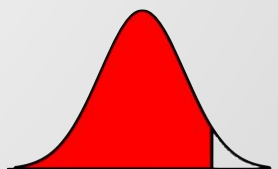
☑ Drop nan ratio>0.5 features

☑ Drop note type features

Data

	house_age	bedroom	livingroom	bathroom	manage_dummy	furniture_dummy	elevator_dummy	manager_dummy	rental_period	1F_dummy	price
count	18482	18482	18482	18482	18482	18482	18482	18482	18482	18482	18482
mean	32.05943317	3.0226166	1.174494102	2.231630776	0.578130073	0.812736717	0.607780543	0.541662158	416.7769722	0.041499838	16107.43096
std	11.97784959	4.29126347	1.275701766	4.296573991	0.493871328	0.390133286	0.488258388	0.498274722	232.8556602	0.199448624	12317.80348
min	0.361643836	0	0	0	0	0	0	0	0	0	2000
25%	26.29041096	1	0	1	0	1	0	0	364	0	9500
50%	30.49315068	3	1	1	1	1	1	1	364	0	14500
75%	42.45890411	3	2	2	1	1	1	1	364	0	19000
max	73.71232877	71	34	71	1	1	1	1	4382	1	230000
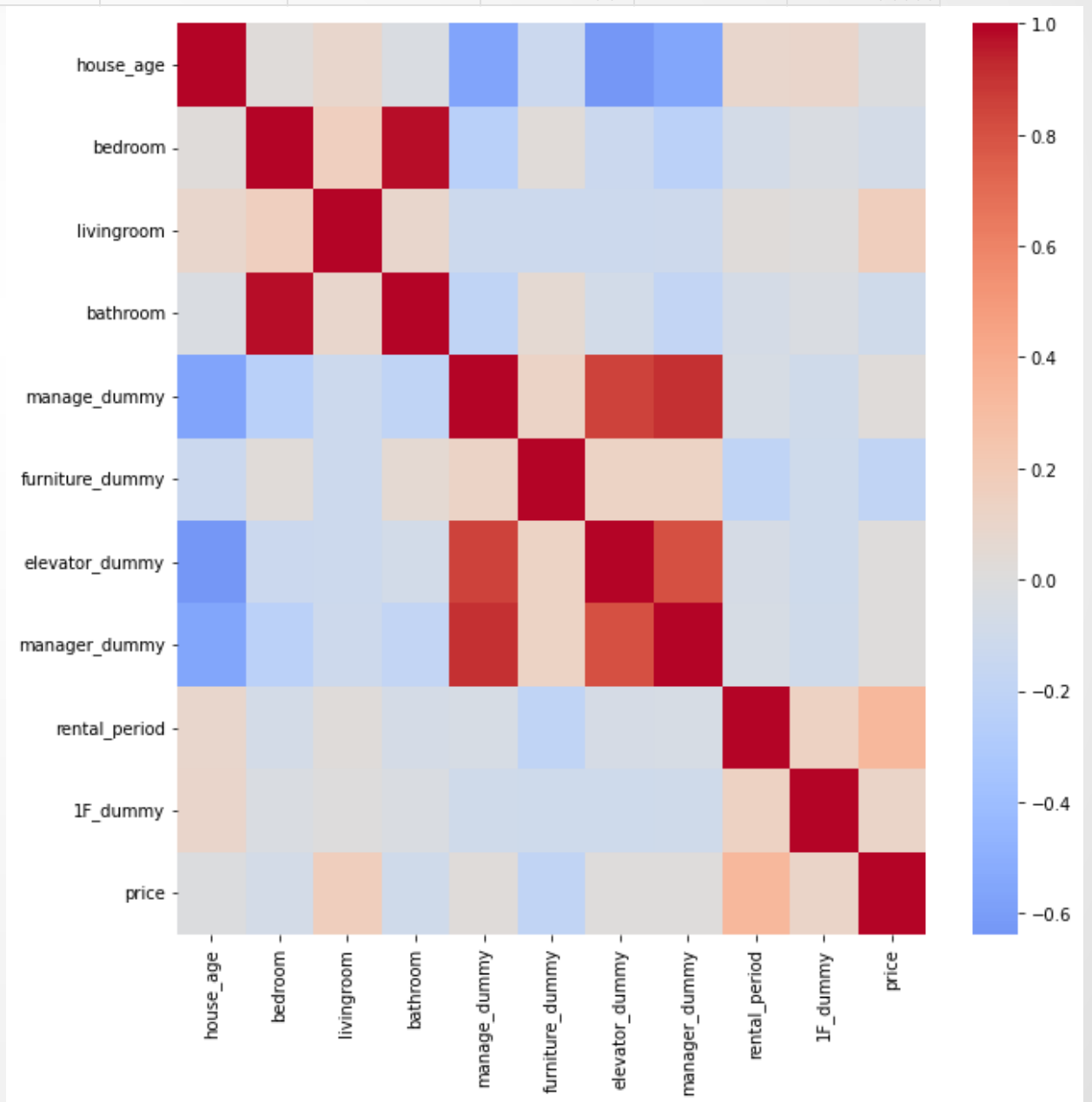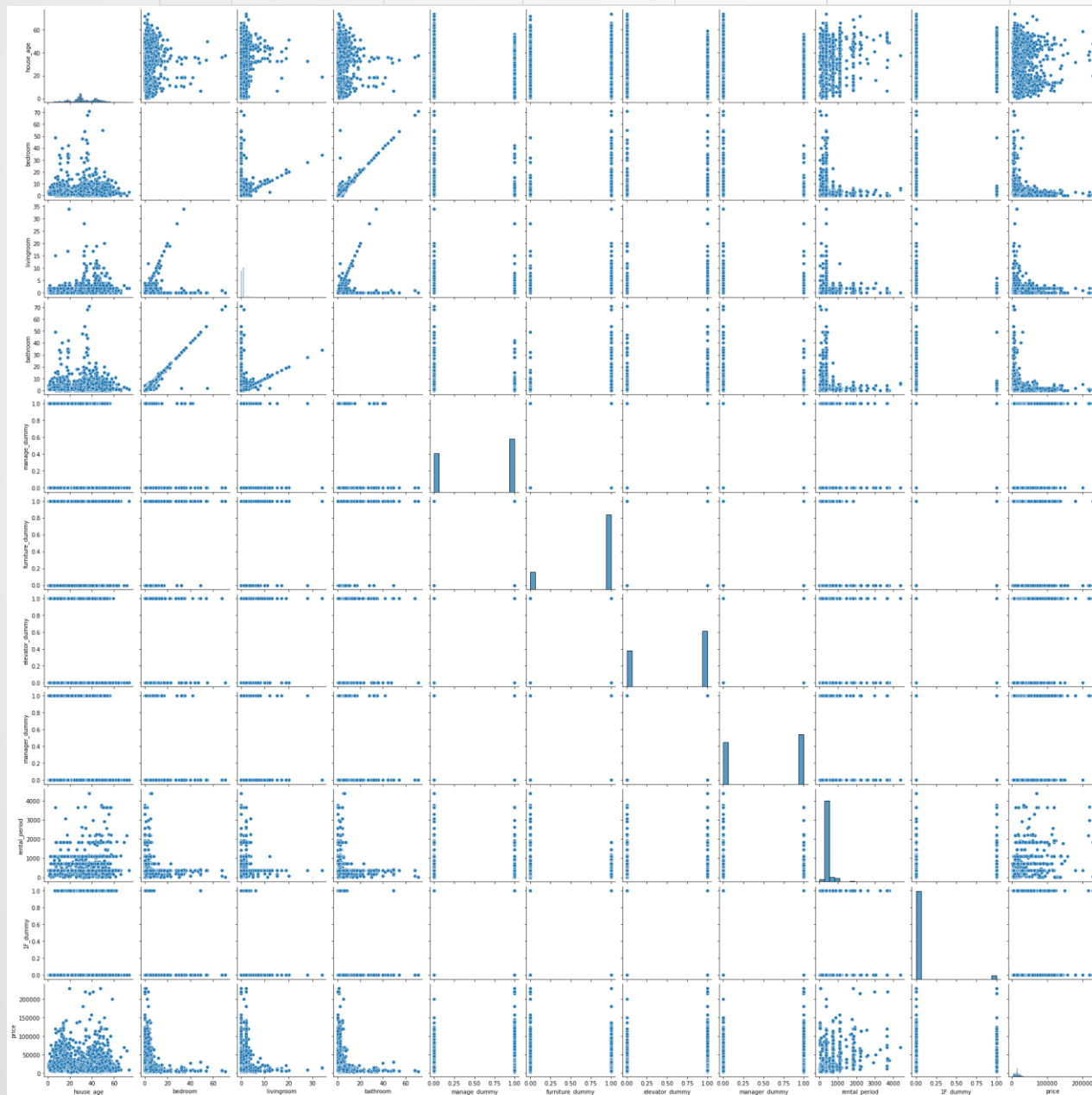
Method

- Linear Regression(benchmark)

- Dicision Tree

- Random Forest

- XGBoost

Method

⊡ Linear Regression(benchmark)

   No hyperparameter

⊡ Dicision Tree

⊡ Random Forest

⊡ XGBoost

⊡ Using GridSearchCV

   scoring:MSE, CV=5

Dicision Tree				
max_depth	None	10	20	30
min_samples_leaf		1	5	10
min_samples_split		2	10	20
Random Forest				
n_estimators		50	100	200
max_depth	None	10	20	30
min_samples_split		2	10	20
XGBoost				
n_estimators		50	100	200
learning_rate		0.01	0.1	0.2
max_depth		3	5	10
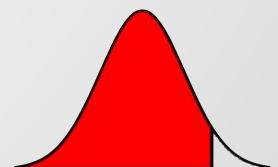
Result

- ⊡ Linear Regression(benchmark)

  No hyperparameter

- ⊡ Dicision Tree

- ⊡ Random Forest

- ⊡ XGBoost

Dicision Tree				
max_depth	None	10	20	30
min_samples_leaf		1	5	10
min_samples_split		2	10	20
Random Forest				
n_estimators		50	100	200
max_depth	None	10	20	30
min_samples_split		2	10	20
XGBoost				
n_estimators		50	100	200
learning_rate		0.01	0.1	0.2
max_depth		3	5	10

Result

	TEST			
	MSE	R2		
Linear Regression	71618550.41	0.52		
Dicision Tree	91632634.07	0.38		
Random Forest	42628068.83	0.71		
XGBoost	32161241.09	0.78		

Result

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