How Does Superhost Accreditation Benefit Airbnb Hosts in Chicago?

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Research Question

How Does Superhost Accreditation Benefit Airbnb Hosts in Chicago?

- How does superhost status impact hosts' revenues in Chicago?
- Do Chicago superhosts get a 'brand premium' (set higher price)?
- In which aspects do superhosts distinguish themselves from their normal counterparts?
- Does crime rate damage Airbnb business in Chicago?

Data & Variable Construction

- Data Source:
  Detaialed listing data of August 2019 in Chicago from insideairbnb.com
- Construction of occupancy rate:
- $occupancy\ rate = \frac{reviews\ per\ month}{review\ rate} * \frac{average\ length\ of\ stay}{30}$
- From the report of insideairbnb.com, in Chicago, $average\ length\ of\ stay = 3\ days$, $review\ rate\ = 0.5$

Correlation heat map

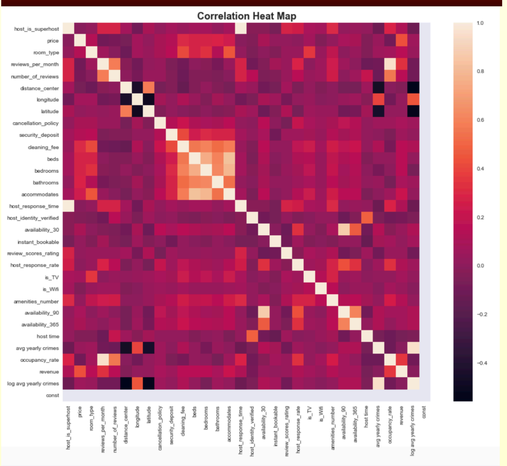

Fig1. Correlation heat map of the dataset

Acknowlegements

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Accommodation geo-graph by crime rate & revenue

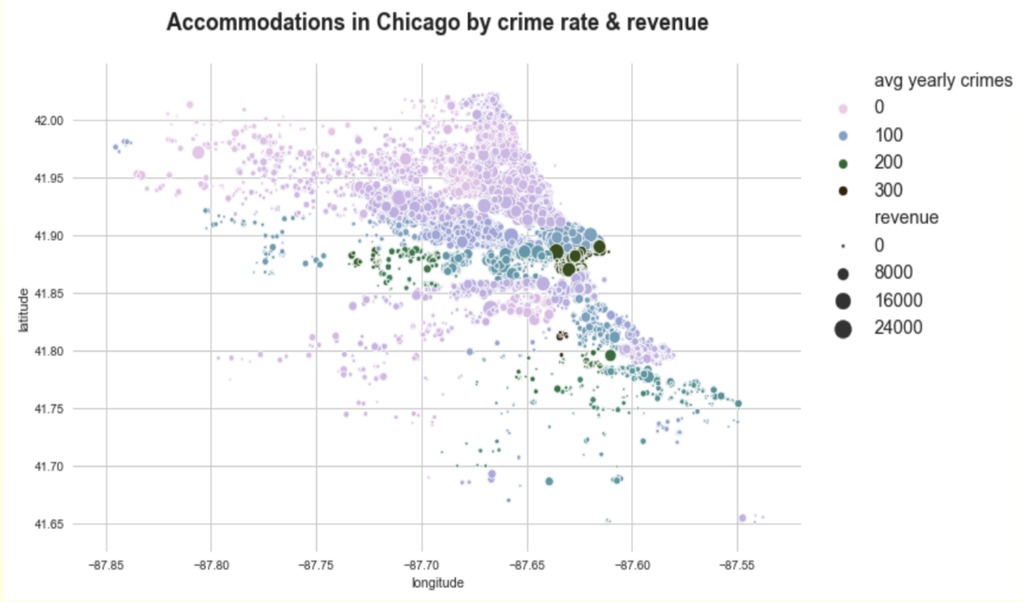

Fig2. Accommodation geo-graph by crime rate & revenue

- We haven't seen any negative effects of average yearly crimes per thousand residents on host revenues in Chicago from the graph

OLS: revenue prediction

	Model 4	Model 5	Model 6
const	-974.21** (124.53)	-2056.02*** (262.08)	-3438.09*** (242.89)
host_is_superhost	325.63*** (30.86)	310.84*** (32.68)	268.35*** (28.97)
occupancy_rate	35.95*** (0.45)	38.00*** (0.56)	36.64*** (0.50)
price	1.08*** (0.04)	1.06*** (0.04)	0.53*** (0.04)
log avg yearly crimes	192.23*** (25.60)	182.03*** (28.30)	155.51*** (25.60)
host time		-0.04** (0.02)	-0.06*** (0.02)
host_response_rate		142.11*** (46.54)	-120.82*** (42.65)
number_of_reviews		-2.78*** (0.32)	-2.78*** (0.28)
review_scores_rating		11.57*** (2.34)	9.76*** (2.08)
host_response_fraction		142.11*** (46.54)	-120.82*** (42.65)
cancellation_policy			100.19*** (15.14)
security_deposit			0.13*** (0.04)
cleaning_fee			1.71*** (0.32)
beds			-109.85*** (11.78)
bedrooms			89.27*** (20.03)
bathrooms			76.77*** (22.72)
accommodates			165.19*** (9.05)
room_type			368.64*** (28.86)
R-squared	0.76	0.76	0.78
No. observations	8559	8559	8559

* p<.1, ** p<.05, ***p<.01

Table3. OLS revenue prediction

Conclusion

- Superhosts do have significantly higher income in comparison with normal hosts
- Such accreditation does not bring up their rental price
- One critical channel through which superhosts earn more lies in their capacity to maintain relatively higher occupancy rate, which is achieved mainly by better accommodation services
- Even though Chicago has a notorious reputation for high crime rate, safety issues bother neither travelers nor Airbnb hosts

Limitations

- As occupancy rate is calculated based on certain variables in our dataset, there can be estimated error
- For certain variables, we replace the missing values with other assumed values (like mean, 0, etc.), which could possibly introduce bias in our estimation
- Since we only investigate the situation when Airbnb business generates highest revenues, this may omit other important patterns of the business

Decision tree: revenue prediction

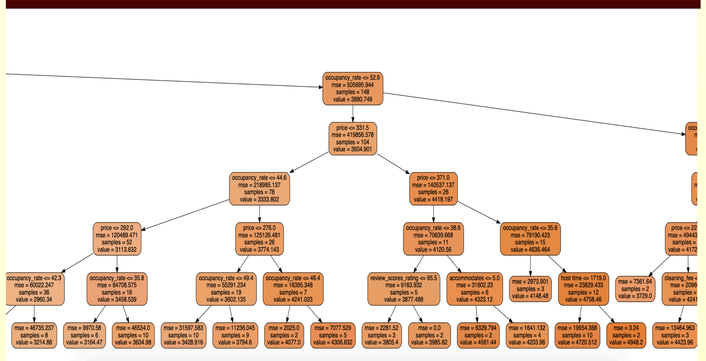

Fig3. part of the decision tree

Variable	T value	P value
host_is_superhost	inf	0
review_scores_rating	30.78394471	6.0413E-196
occupancy_rate	28.24623481	1.923E-166
number_of_reviews	24.73389822	5.2424E-128
bedrooms	7.370895682	1.87964E-13
accommodates	7.310573409	2.98256E-13
beds	6.943957388	4.21273E-12
cleaning_fee	3.762768068	0.00016926
bathrooms	2.446236554	0.014457674

Table1. significant difference

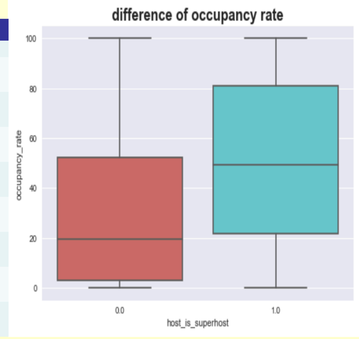

Fig4. significant occupancy rate difference

KNN model: price prediction

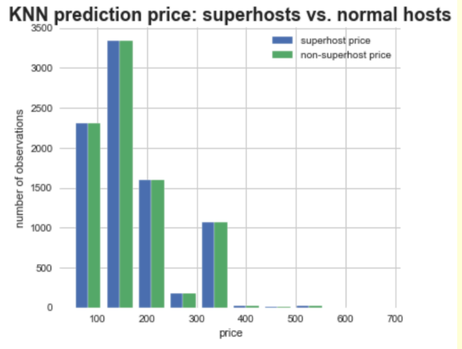

Fig5. KNN price prediction
T value = -0.0346, P value = 0.9724

- KNN predicted price: no significant difference between supherhosts and normal hosts
- OLS predicted price: superhost status has no significant effects on price
- Decision tree revenue prediction: occupancy rate is the key predictors
- OLS predicted revenue: Superhosts get more revenues by maintaining a higher occupancy rate
- Crime rate is not a big concern plaguing the business of Airbnb in Chicago

OLS: price prediction

	Model 1	Model 2	Model 3
const	-16.57 (12.18)	-111.71*** (25.67)	-183.06*** (21.06)
host_is_superhost	-2.63 (2.94)	3.51 (3.20)	4.96* (2.58)
log avg yearly crimes	39.26*** (2.79)	33.06*** (2.76)	25.92*** (2.28)
occupancy_rate		-0.67*** (0.05)	-0.66*** (0.04)
host time		-0.01*** (0.00)	-0.01*** (0.00)
host_response_rate		44.03*** (4.57)	4.80 (3.80)
number_of_reviews		-0.14*** (0.03)	-0.03 (0.03)
review_scores_rating		1.32*** (0.23)	1.15*** (0.19)
cancellation_policy			8.45*** (1.34)
security_deposit			0.02*** (0.00)
cleaning_fee			0.41*** (0.03)
beds			-8.71*** (1.12)
bedrooms			6.48*** (1.80)
bathrooms			30.53*** (2.04)
accommodates			17.63*** (0.86)
R-squared	0.02	0.07	0.40
No. observations	8548	8548	8548

* p<.1, ** p<.05, ***p<.01

Table2. OLS price prediction

Future work

- To better estimate the occupancy rate, we will construct a better model to compute it, so as to approach the true value as much as possible
- To better understand the business pattern, we shall use more data of different periods of many years. Then a time series model may be in our need.

References

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