Evaluation of Rent Prediction Models using Floor Plan Images

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Introduction

Onoki Hisanoseku：
Keizokutinnryohyokawosaikosuru,
Urban housing studies, Housing Shinpo, 2016.

The features of properties

- There are almost no properties with the same attributes
- Property attributes have a strong impact on prices
  - Age, Level, building structure

Rental Case Comparison Method [Onoki, 2016]

- Determine the rent referring to the property around the target property and similar property
- Using Hedonic approach

Hedonic approach

$$\hat{y}_i = \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \cdots + \alpha_n x_n + \beta$$

Rent — Exclusive area — Location — Stories — Age

this method does not consider the floor plan images

Previous studies with hedonic approach

Category of explanatory variable

	Building Structure	Location /Access	Around Environmen	Sales contract	Image
Ram+ 2019	○	○	○	×	×
Philipp+ 2016	○	○	○	×	×
Jun+ 2017	○	○	○	○	×
Our study	○	○	×	○	○

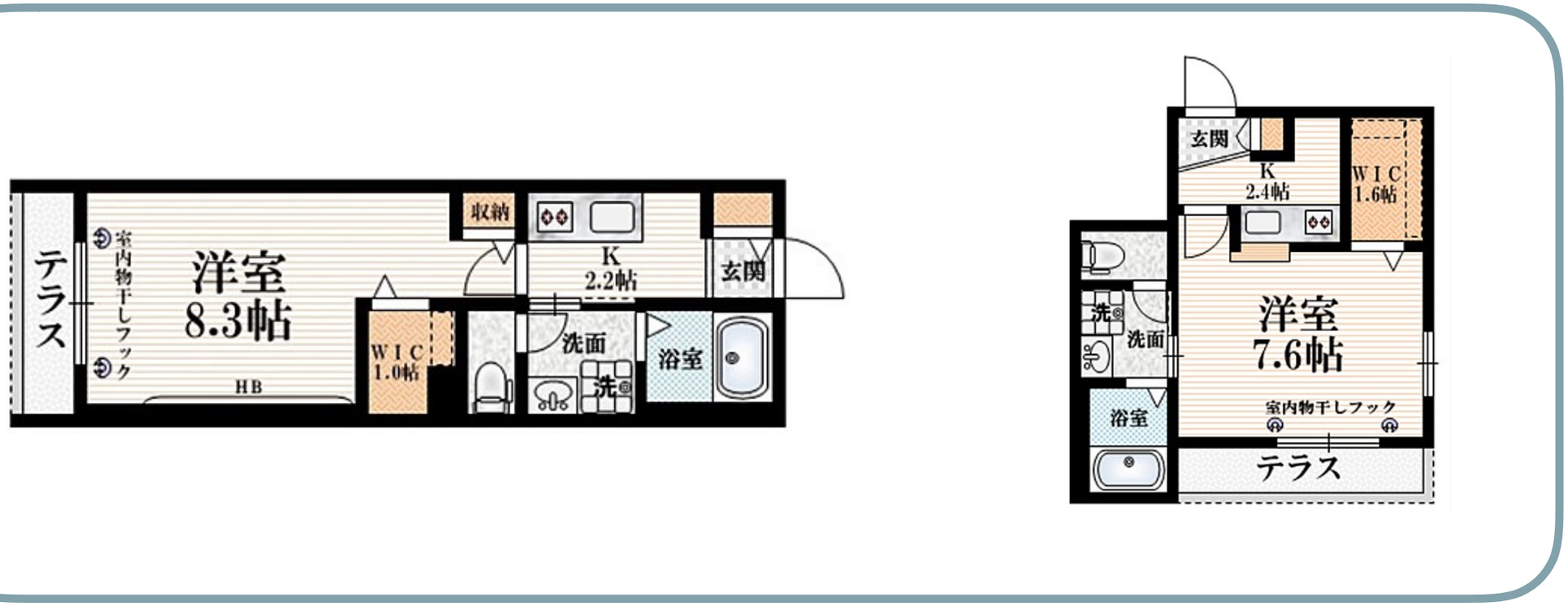
- Ram P. Dahal and Robert K. Grala and Jason S. Gordon and Ian A. Munn and Daniel R. Petrolia and J. Reid Cummings：
  A hedonic pricing method to estimate the value of waterfronts in the Gulf of Mexico, Urban Forestry & Urban Greening, vol.41, pp. 184-194, 2019.
- Dr. Philipp Deschermeier and Björn Seipelt：
  A Hedonic Rent Index for Student Housing in Germany, Cologne Institute for economic research, pp.1–12, 2016.
- yung-Jin Jun, Hee-Jae Kim：Measuring the effect of greenbelt proximity on apartment rents in Seoul, Cities, vol. 62, 2017.

The features of floor plan images

Kiyota youzi, Yamazaki Toshihiko, Shimizu Hirohi：Hudosan to AI, Artificial intelligence, vol.32, 2017.

- Even if the layout type is the same, there are also different types of floor layout

- In Japan there is a custom to look at FPI when searching for a desired rental property in many cases[Kiyota+, 2017]



Ex. Different floor plan images in same property

Our Methods

Purpose: Clarify the influence that a floor plan has on rents.

Approach:Compare

- Prediction model without the floor plan images (LR)
- Prediction model with the floor plan images
  - Feature Extraction by Linear Transformation (PCA-LR)
  - Feature Extraction by nonLinear Transformation（VGG-LR)

Thank you for your attention