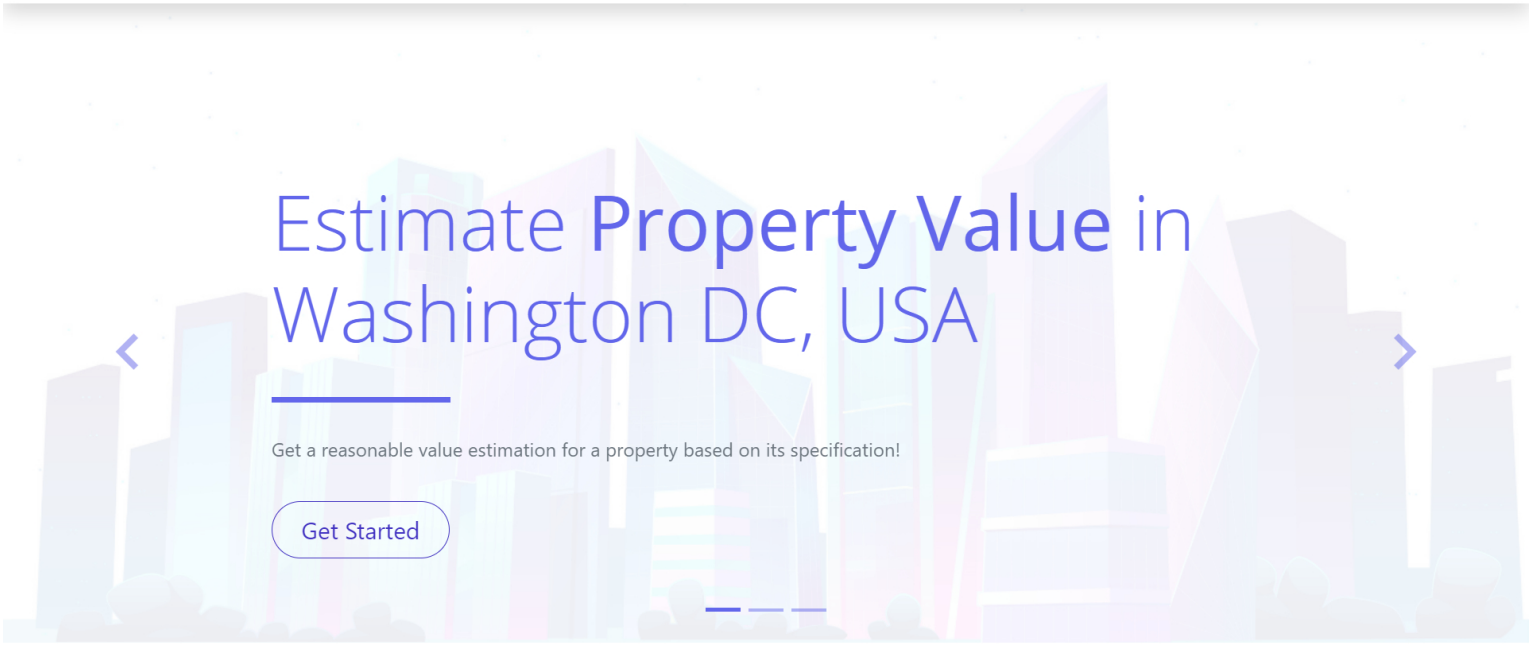

Estimate **Property Value** in Washington DC, USA

Get a reasonable value estimation for a property based on its specification!

Get Started

Purwadhika JCDS Final Project - Matplotlib Team

In this project, we position ourselves as a part of the Data Scientist Team in a Financial Institution, MPL Bank, in Washington DC, USA. We are assigned to work on a project to develop a Machine Learning (ML) solution. The project owner is the Underwriter Team of MPL Bank. We will help the Underwriter Team to make an improvement in their process of underwriting, specifically in the process of property appraisal and valuation.

MPL Bank orders the appraisal through a third party, an appraisal management company (AMC), in order to comply with the federal appraiser independence requirements. However, the appraisal process performed by an external party has a risk of fraud or producing erroneous results. Thus, the project owner wants to address these issues.

Problem Definition

Based on the elicitation process with the project owner, we found that they want to improve the accuracy of their underwriting process, specifically in the process of evaluating the appraisal. In the process of evaluating appraisals, there are some risks that the project owner wants to minimize, such as fraud and erroneous appraisal results given by the AMC. In addition, there is also a problem that often happens regarding the difference between the agreed offer made by a borrower and the property seller and the actual property valuation. Since lenders can't lend out money more than a property is worth, all of these risks may cause the project owner to determine wrong appraisal value and to make a wrong decision whether to give the loan to a borrower.

To address these risks and improve their business process, the project owner needs a reliable autonomous system that can provide an estimation value that can be used to compare the value given by the AMC.

The expected output of this project is a system that can make an estimation of an accurate and reasonable value (price) for a property based on the aspects of the property by using ML. However, due to the limitation of our time budget, we limit the capability of our model in this project to predict an output only for properties with grade lower than Exceptional, since Exceptional properties have a price range that is very different than the rest of properties with other grades.

Business Objectives

Maximize profit by making the right decision to

Minimize loss and risks of fraud and erroneous

give a loan with an optimal amount.

valuation.

Data Requirements

The value that we want to predict is the value (price) of a property. The required information needed to make a prediction are the features of the house (e.g., gross building area, the number of rooms, the number of bedrooms, etc), the condition of the house, the location, etc.

Analytic Approach

ML Techniques

Since the value (price) that we want to predict is a continuous value, this problem can be addressed with Supervised Learning, more specifically with Regression.

Risk

The risk that may be caused by wrong prediction from the ML model is profit loss especially when the model gives under appraised value (price).

Performance Measure

The performance measures to evaluate the ML model are Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and the Coefficient of Determination (R^2).

Action

The business user can utilize the prediction result by comparing it with the appraisal value given by the AMC.

Value

The values created from the project are the improvement in the underwriting process and the maximized profit from giving the right appraisal and making the right decision in providing loan.

Washington DC, USA.

- About
- Estimator
- Insights

- Kemal Isfan
- Rezki Fauziansyah

Property Value Estimator

Washington DC, USA

The required data to estimate the value of a property are the location, the condition and the specification of the property.

Fill the form to estimate property value!

Location

Ward
Select Ward

Quadrant
Select Quadrant

Longitude

Latitude

Condition

Building Age (in years)

Renovation Years (in years)

Last Sale Year
Select Last Sale Year

Condition
Select Condition

Grade
Select Grade

Qualified?
Qualified?

Specification

Gross Building Area (in sqft)

Land Area (in sqft)

Style
Select Style

Use Code
Select Use Code

Rooms

Bedrooms

Bathrooms

Half Bathrooms

Kitchens

Fireplaces

AC
Has AC?

Heating System
Select Heating System

Roof
Select Roof

Structure
Select Structure

Estimate

Property Value Estimator

Washington DC, USA

The required data to estimate the value of a property are the location, the condition and the specification of the property.

Fill the form to estimate property value!

Location

Ward: Ward 5	Quadrant: NE
Longitude: -76.994888	Latitude: 38.95709777

Condition

Building Age (in years): 67	Renovation Years (in years): 48
Last Sale Year: 2014	Condition: Good
Grade: Average	Qualified?: Qualified

Specification

Gross Building Area (in sqft): 1088	Land Area (in sqft): 2838
Style: 2 Story	Use Code: 13 - Single family residential home with slight commercial/in
Rooms: 6	Bedrooms: 3
Bathrooms: 1	Half Bathrooms: 1
Kitchens: 1	Fireplaces: 0

AC
Yes

Heating System
Warm Cool

Roof
Concrete / Comp Shingle / Built Up / Metal-Pre / Typical / Co

Structure
Semi-Detached / Multi / Town Inside / Town End

Estimate

MPL Bank

Washington DC, USA.

MPL Bank

- Home
- About
- Estimator
- Insights

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Our Project

- Purwadhika JCDS Final Project

The estimated property value is

$353,441.85

Property Information

Value Estimation

- Estimated Price : $353,441.85
- Estimated Error (Mean Absolute Error) : ± $47,183.05

Location

- Area : Ward 5
- Quadrant : NE
- Longitude : -76.994888°
- Latitude : 38.95709777°

Condition

- Building Age : 67 years old
- Renovation Years : 48 years since last renovation
- Last Sold in : 2014
- Condition : Good
- Grade : Average
- Qualified : Yes

Specification

- Gross Building Area : 1088 ft²
- Land Area : 2838 ft²
- Style : 2 Story
- Use Code: 13 - Single family residential home with slight commercial/ind
- Number of Rooms : 6
- Number of Bedrooms : 3
- Number of Bathrooms : 1
- Number of Half Bathrooms : 1
- Number of Kitchens : 1
- Number of Fireplaces : 0
- Air Conditioner : Yes
- Heating System : Warm Cool
- Roof : Concrete / Comp Shingle / Built Up / Metal-Pre / Typical / Composition Ro
- Structure : Semi-Detached / Multi / Town Inside / Town End

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Washington DC, USA.

MPL Bank

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Dashboard

Property Insights in Washington DC, USA

These visualizations show the overview of property prices in Washington DC, USA based on the location, sale year from 1992 - 2018, grade, and use code.

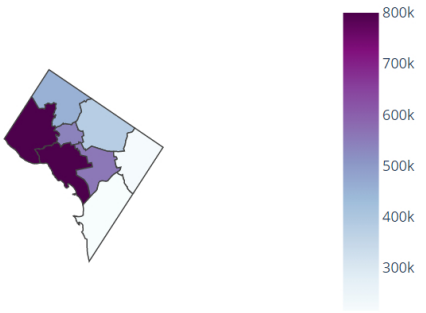
Insight

Below is a Choropleth map of the Washington DC, USA depicting the median property price by Ward (Ward 1-8). Ward 2 & 3 have the highest median price, while Ward 7 & 8 have the lowest median price.

Insight

The median property selling price in Washington DC, USA has an overall upward trend since 1992 until 2018. However, in 2008 - 2009 the price went down due to the global financial crisis and the housing crash.

Washington DC Ward Map



Median Property Price Each Year

Insight

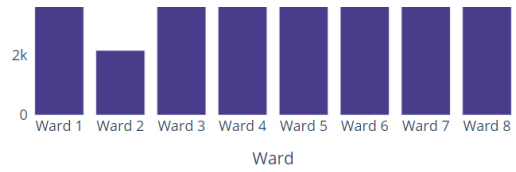
Properties located in Ward 2 & 3 have the highest median price of around USD800,000. Whereas properties located in Ward 7 & 8 have the lowest median price of around USD220,000.

Insight

Ward 4, 5, and 6 are possibly the most densely populated area based on the number of properties located in those wards. Whereas Ward 2 is possibly considered as an elite residential area considering the high median price and the low number of properties.

Median Property Price by Ward

Number of Properties by Ward



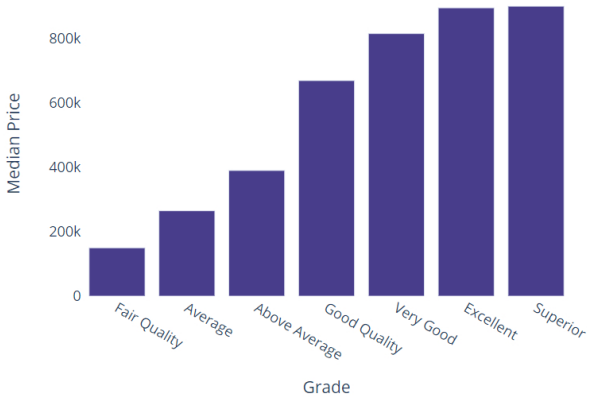
Insight

The grade of a property shows a correlation with the median price. The better the grade of a property is, the higher the price.

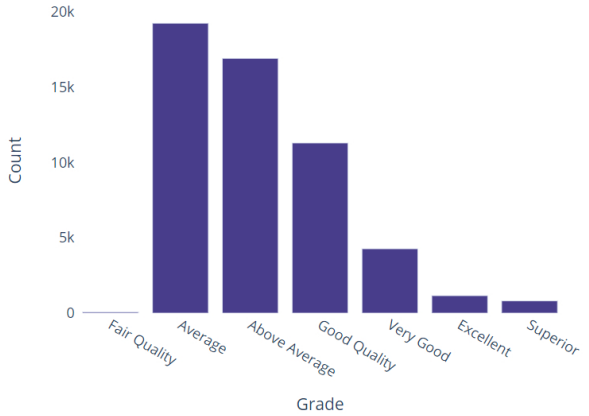
Insight

Most of properties in Washington DC, USA are classified as 'Average' and 'Above Average' by appraisers. There are also very few properties that are classified as 'Fair Quality'.

Median Property Price by Grade



Number of Properties by Grade



Insight

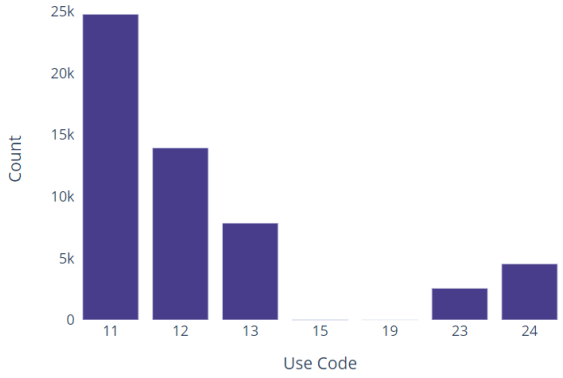
Based on the property use code, Four Living Units have the highest median price followed by Town House and Single Family Residential.

Insight

Most properties in Washington DC, USA are Single Family Residential. There are very few Townhouse and SFR properties.

Median Property Price by Use Code

Number of Properties by Use Code



Remarks

- 11 : Single family residential home used as such
- 12 : Single family residential home with non-economic 2nd unit
- 13 : Single family residential home with slight commercial/ind
- 15 : Townhouse - Planned Development
- 19 : SFR - Manufactured Home (MH on permanent foundation)
- 23 : Triplex; double or duplex with single family home
- 24 : Four living units; e.g. fourplex or triplex w/SFR

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