Real Estate Investment Application

Scott Rosengrants
DEN - DSI - 10 Capstone Project

What RE Investors Currently Do

1. Manually search and calculate rental properties
2. Search inconsistently for fair market rents
3. Call a lender each time a property is considered

Project Objective - Problem Statement

1. Given a property address can relevant rental amounts be found for the property? Can standard real estate metrics be automated?

2. According to the location of the property and user provided financial information can a model be developed for predicting the approval of a potential mortgage loan?

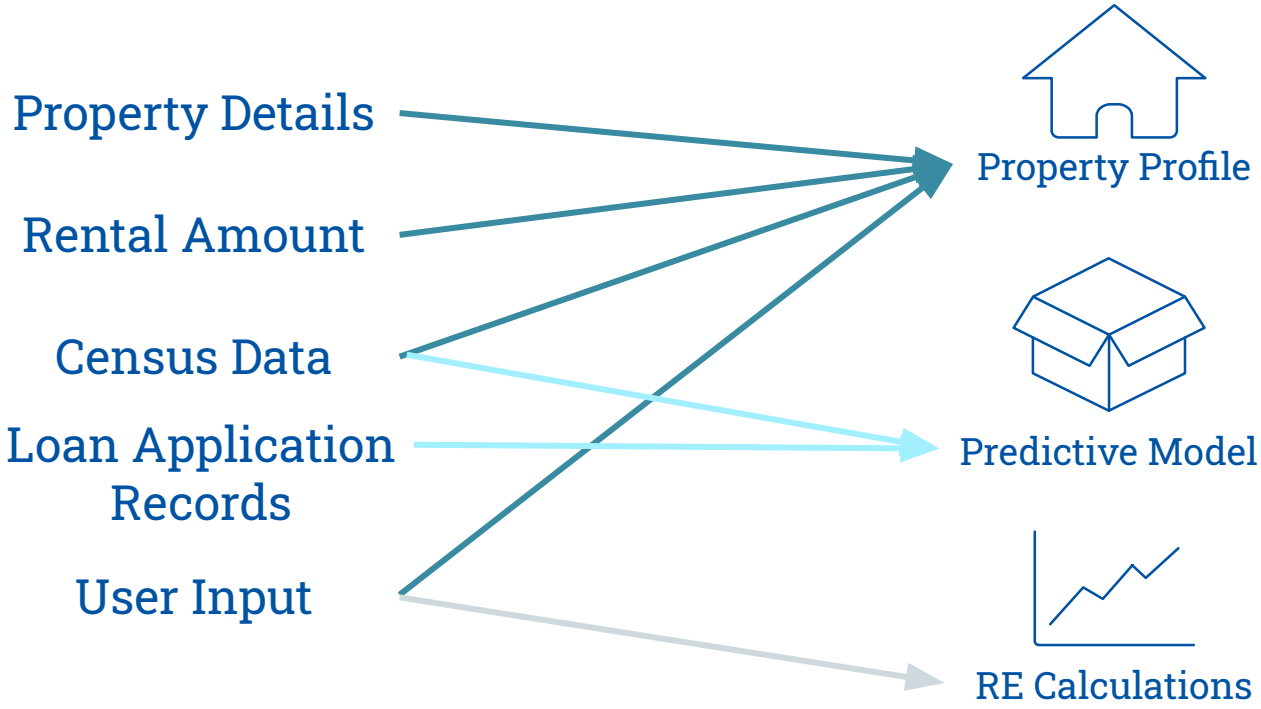
Start with the Data

1. Property Records
   - ATTOM Data Solutions API

2. Fair Market Rental Information
   - County Level Fair Market Rents FY 2020

3. Mortgage Records
   - 2018 Loan/Applications Records

Data Flow


Property Details
Rental Amount
Census Data
Loan Application Records
User Input
Property Profile
Predictive Model
RE Calculations

Property Profile

Elements in the Property Profile

- Location and Census demographic information
- Property Attributes
  (Bedrooms, Bathrooms, Square footage)
- Fair market rent based on County
- User Inputs
  (Price, income, type of loan)

Predictive Model

Model Prediction Classes

Two Classification
Approved
Denied

Ten Classification
Approved
Debt-to-income ratio
Employment history
Denied
Credit history
Collateral
Insufficient cash (downpayment, closing costs)
Unverifiable information
Credit application incomplete
Mortgage insurance denied
Other

Predictive Model

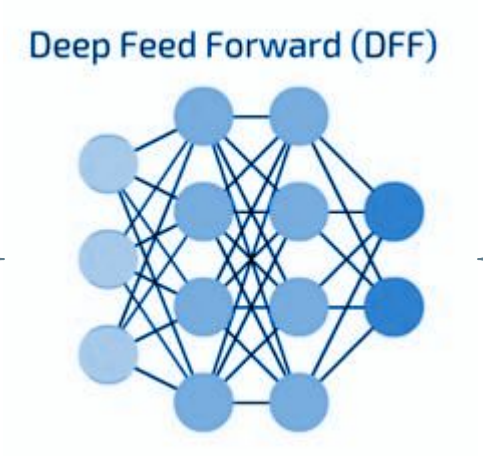
Models Attempted

Model Type	Accuracy
Logistic Regression (10-Class)	**91.276%**
Logistic Regression (2-Class)	**91.276%**
FF Neural Network (10-Class)	**92.11%**
FF Neural Network (2-Class)	**94.15%**

Predictive Model

Inputs to the Model

- Loan type information
- Census area demographics
- User's income
- Property value
- Location
- 72 elements in total



Targets

- Approved for mortgage
- Denied for mortgage

Model Accuracy

94.15%

RE Calculations

Cash Flow Calculation
(monthly or annual)

Income (Rent)

- Vacancy Rate

- Expense Reserves

- Taxes

- Insurance

- Financing Expense

Cash Flow

RE Calculations

Cash on Cash Return (COC) Calculation

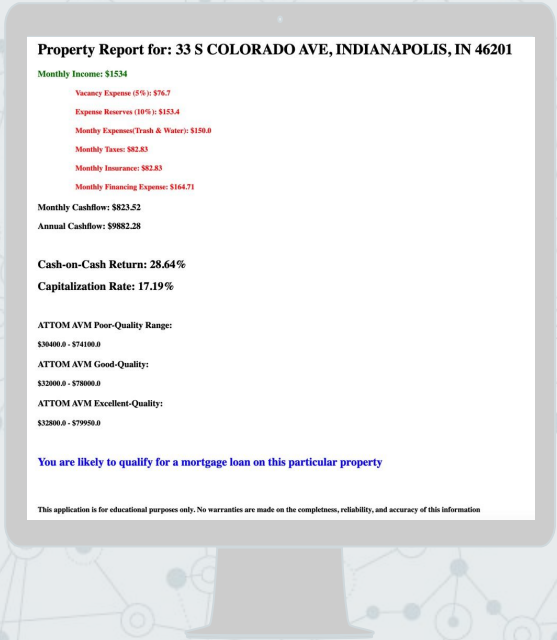
$$\frac{\text{Annual Cash Flow}}{\text{Total Cash Invested}} \times 100$$

RE Calculations

Capitalization Rate (Cap Rate) Calculation

(no financing costs)

$$\frac{\text{Annual Cash Flow}}{\text{Price of the Property}} \times 100$$



Putting It All Together

Flask Application Example

Large Limitations

The rental data is only based on County, this limits the accuracy of this information.

The model is a “black-box” model resulting more accurate predictions but unfortunately little to no insight to the user as to why they may be denied for a loan.

The data used to train the model was limited and may not be indicative to actual approval odds.

1. Debt - to - Income ratio
2. Credit Score

The model likely picked up on a trend that is unseen in the data. Limiting the ability to replicate results.

Improvements & Additional Work

- Credit Score and Debt-to-Income - higher accuracy and usability of model predictions
- Neighborhood Specific Rental Figures - multiple rental figures per county
- Multiple Unit Analysis - multifamily properties
- A pro-active application - emails based on user settings

Sources

ATTOM Data Solutions

https://api.developer.attomdata.com/

Rental Data

https://www.huduser.gov/portal/datasets/fmr.html#2020_data

Mortgage Data

https://ffiec.cfpb.gov/data-publication/dynamic-national-loan-level-dataset/2018

Neural Network Image

https://towardsdatascience.com/the-mostly-complete-chart-of-neural-networks-explained-3fb6f2367464

Flask Framework

https://coreyms.com/

Thanks!

Any questions?

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