# Possible project idea: Predicting future mortgage ratesI bought [https://refinance.win](https://refinance.win/) this past week - could use logo/color scheme like this maybe [color palette](<https://www.colourlovers.com/palette/4630980/Agir>)![ing](<https://i.imgur.com/UC8xF3b_d.jpg?maxwidth=640&shape=thumb>)Why this is interesting  
\* In late April, [Seeking Alpha publishes a fantastic article](<https://seekingalpha.com/article/4340921-why-you-should-wait-to-refinance>) showing  
the relationship between 10-year Treasury yields and Mortgage rates.  
This report highlights a large gap between current mortgage rates and Treasury yields. This gap appears to  
represent a potential future buying opportunity for homeowners  
\* Days later, on May 1, mortgage rates hit an all-time low, dropping 10  
basis points [another article from Seeking Alpha](<https://seekingalpha.com/news/3567005-mortgage-rates-sink-to-all-time-low>)![Clear relationship](<https://static.seekingalpha.com/uploads/2020/4/28/1112099-15881191373848379.png>)## What the presentation might look like  
1. Slide 1: Historical relationship between Treasury Bonds rate  
and mortgage rates    
2. Slide 2: Machine learning predictions for next several weeks/months/etc  
3. Slide 3: App architecture overview of our \*\*"When should you refinance your home?"\*\* app.  
\* \* The app asks a series of questions related to  
current home financing ("How much do you owe? What interest rate?  
How many more years? What is your credit score?")  
\* \* After the user enters their questions, the app uses APIs  
to get updated weekly future projections for what mortgage  
rates they will likely be offered over the next 10 weeks.  
\* \* App then provides a 10- week projected mortgage rates chart  
to the user that is interactive and includes visual  
cues that show a clear action-based plan of what week(s)  
represent the best and worst refinancing opportunities  
(i.e. wait three more weeks and then lock it in")  
\* \* When the user drills into a given week, the app charts  
future potential savings if they are able to lock on that  
rate at that time  
4. Demo of app  
5. Slide 4: Final analysis and recommendations for group (e.g. "Use this app and it can tell you what week is likely to be the best week to lock in your refi rate"# Web app architecture possibilities  
\* Frontend - React?  
\* Data persistence - SQLite  
\* Data pulls - Python for API calls, possible OCR read or web scrape (Freddie Mac data?)  
\* Endpoints - Flask  
\* Interactive visualizations - d3? ZingChart?  
\* Hosting - Heroku because we can deploy "live" Python/Flask apps to it  
\* Machine learning - simple linear regression is likely all we need so Python  
with sklearn is likely all that is needed# Data source possibilities  
## Treasury yield history  
\* [Quandl for Treasury yield history (TMUBMUSD10Y)](<https://www.quandl.com/data/FRED/DGS10-10-Year-Treasury-Constant-Maturity-Rate>)## Current mortgage rates  
\* Freddie Mac data - [30-yr fixed monthly avg API](<https://www.quandl.com/data/FMAC-Freddie-Mac>) - [30yr fixed monthly avg tables](<http://www.freddiemac.com/pmms/pmms30.html>)  
\* "[Bankrate.com](http://bankrate.com/) U.S. Home Mortgage 30-Year Fixed National Average Index"\* \* Credit score => Mortgage rate offered mapping - <https://www.myfico.com/loan-center/home-mortgage-rate-comparison/default.aspx> (for matching "user's current credit score" to what rate they likely be offered if refinancing)  
## Credit scores for mortgages  
1. Federal Reserve Bank of New York and Equifax Risk Score data - [Excel file for 2019 Q1](<https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data/xls/hhd_c_report_2019q4.xlsx>) - [main home page](<https://www.newyorkfed.org/microeconomics/hhdc/background.html>) - [Data dictionary](<https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data/pdf/data_dictionary_HHDC.pdf>) - [Analysts report](<https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data/pdf/hhdc_2019q4.pdf>)  
2. [Crowd-sourced mortgage data](<https://rate.exposed/>)## Individual mortgage APR% by date  
1. [Home Mortgage Disclosure Act's "Modified Loan/Application Register (LAR)" data via API](<https://cfpb.github.io/hmda-platform/#hmda-filing-api-authorization>)  
\* \* Key columns: "Interest Rate", "Credit Score", "Income", "State", "County", "Action Taken", "Loan Type", "Loan Purpose", "Type of Purchaser", "Rate Spread", "Applicant or Borrower - Name and Version of Credit Scoring Model", "Debt-to-Income Ratio", "Combined Loan-to-Value Ratio", "Loan Term", "Introductory Rate Period", "Property Value",  
\* \* [Schema](<https://files.consumerfinance.gov/f/documents/cfpb_reportable-hmda-data_regulatory-and-reporting-overview-reference-chart-2019.pdf>) - page 20 has "credit score" column  
\* \* [Headers only](<https://ffiec.cfpb.gov/documentation/2019/modified-lar-header/>)  
\* \* Credit score and other sensitive data redacted# Example using a "Should you refinance now?" calculator  
<https://www.nerdwallet.com/mortgages/refinance-calculator>We could use this as our mock and just update it to  
use our machine learning projected mortgage  
rates# Example inspiration for visualizations  
![img](<https://i.imgur.com/CppHhYr_d.jpg?maxwidth=640&shape=thumb&fidelity=medium>)Source: <https://www.thebalance.com/mortgage-rates-by-credit-score-4171904>Tableau Public gallery search results:  
\* ["mortgage"](<https://public.tableau.com/en-us/search/all/mortgage>)  
\* ["mortgage rates"](<https://public.tableau.com/en-us/search/all/mortgage> rates)  
\* [""](<https://public.tableau.com/en-us/search/all/>)  
\* [""](<https://public.tableau.com/en-us/search/all/>)  
\* [""](<https://public.tableau.com/en-us/search/all/>)  
\* [""](<https://public.tableau.com/en-us/search/all/>)## Interesting Tableau Public dashboards  
### Mortgage rates  
1. [Show cost of a home by year if you bought at that year's avg interest rate](<https://public.tableau.com/profile/serge.lamoureux#!/vizhome/HistoricalMortgageRates/HistoricalMortgageRates_1>)  
1. [Plot various types of loans with interactive chart](<https://public.tableau.com/profile/leonard.kiefer#!/vizhome/RatesandMortgagePayments/RatesandPayments>)  
1. [Nice interactive walkthrough of rates by year](<https://public.tableau.com/profile/recoverydecisionscience#!/vizhome/30YearFixedMortgageRates/MortgageRatesbyMonth>)  
1. [Calculator example](<https://public.tableau.com/profile/insight5128#!/vizhome/Mortgage/MortgagePaymentsCalculator>)  
1. [Forecast through 2023](<https://public.tableau.com/profile/allen.wong.cfa#!/vizhome/MortgageRates30Y/MortgageRates30Y>)  
1. <https://public.tableau.com/profile/daniel.o.neill5399#!/vizhome/MortgageDelinquency/Dashboard1>  
1. <https://public.tableau.com/profile/nicholas.hansen#!/vizhome/Mortgagerates/Obligationsrenten>  
1. [Plot 15yr FRM vs. 5/1 ARM vs. 30yr FRM](<https://public.tableau.com/profile/ih138#!/vizhome/MortgageRates_15662696282070/Sheet1>)### Credit / FICO scores  
1. [Boxplot of FICO score vs. default status](<https://public.tableau.com/profile/liwen6329#!/vizhome/FicoScoresvsDefaultStatus/Sheet1>)  
1. [Histogram of FICO score distribution](<https://public.tableau.com/profile/jackie.bacon#!/vizhome/MotoRefiChallenge-FicoHistogram/FicoHistogram>)  
1. [FICO vs. interest rate offered](<https://public.tableau.com/profile/zujian.ding#!/vizhome/FICOvsInt/Sheet1>)  
1. []()### Dashboard designs  
1. [Nice with multiple interactives](<https://public.tableau.com/profile/onenumber#!/vizhome/CreditUnionHousingAffordabilityReport/Howishousingaffordabilityinourcommunities>)### Misc interesting  
1. [Mockup of an app using Tableau](<https://public.tableau.com/profile/onenumber#!/vizhome/FICOConcept/FICOScoreDashboard>)### Action Items  
| Step  | √ | Requirement |  
| :---: | :---: | :---  
| 01 | √  | Jupyter Notebook showing relationship between Treasury Yield rate and 30yr Fixed Rate Mortgage  
| 02 |  | Web Scraper to scrape/store today's myFICO ranges for FICO credit scores to avg mortgage rate  
| 03 |  |  
| 04 |  |  
| 05 |  |