Alpha Presentation
Surge xOS: Visualization of Automated Underwriting
The Capstone Experience
Team Surge Solutions
Pawel Babkowski
Dakota Klatt
Prudhvi Kuchipudi
Erika Lustig
Drew Rutt
YuanYuan Zhou

From Students…
…to Professionals

Department of Computer Science and Engineering
Michigan State University
Spring 2019
Project Overview

• Make Loan Underwriting Process Fast and Accurate
  ▪ Recommend products directly to customers
  ▪ Allow loan officers to easily view eligible products

• Enable Lenders to Visualize and Adjust Financial Products
  ▪ How the risk and net benefit of a financial product changes as the product policy changes
System Architecture

- AWS
- React Web Components
- Product Guidelines
- S3 Bucket
- JSON File Containing All Products
- API Call
- Product Lab
- salesforce

User
Data Entry

Product Recommendation

1. What is your loan goal?
   - Purchase
   - Refinance
   - Equity
   - Reverse Mortgage

2. What type of property?
   - House
   - Townhome/Duplex
   - Townhome/Condominium
   - Multi-Family
   - Mobile

3. What is your credit score?
   - Poor (300-500)
   - Fair (500-650)
   - Good (650-750)
   - Great (750-850)

4. Which state do you reside in?
   - Michigan

5. Are you or your spouse in the military?
   - Yes
   - No

6. What is the purchase price of your property?
   - 1,000,000

7. How much are you putting for a down payment?
   - 250,000

8. What is your household annual income?
Product Display

**Recommended Product**

30-Year Fixed-Rate FHA

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate</td>
<td>4.375%</td>
</tr>
<tr>
<td>APR</td>
<td>4.469%</td>
</tr>
<tr>
<td>Monthly Payment</td>
<td>$1136</td>
</tr>
</tbody>
</table>

Rates are based on a $300,000 home loan with 30% down.

**Alternative Products**

**30-Year Fixed-Rate**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate</td>
<td>4.125%</td>
</tr>
<tr>
<td>APR</td>
<td>4.474%</td>
</tr>
<tr>
<td>Monthly Payment</td>
<td>$1058</td>
</tr>
</tbody>
</table>

**20-Year Fixed-Rate**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate</td>
<td>4.25%</td>
</tr>
<tr>
<td>APR</td>
<td>4.378%</td>
</tr>
<tr>
<td>Monthly Payment</td>
<td>$1698</td>
</tr>
</tbody>
</table>
Credit Risk Visualization

Credit Risk Analysis

Financial Product
30-Year Fixed-Rate

Credit Score < 640
Amount < 75k
LTV < 90% Denied
Amount 75k - 800k
LTV < 90% Denied
Amount > 800k
LTV < 90% Denied

Credit Score 640 – 720
Amount < 75k
LTV < 90% Denied
Amount 75k - 800k
LTV < 90% Denied
Amount > 800k
LTV < 90% Denied

Credit Score > 720
Amount < 75k
LTV < 90% Approved
Amount 75k - 800k
LTV < 90% Approved
Amount > 800k
LTV < 90% Approved

Guidelines
← Select → Run Simulation

Current Guideline Information
Select a Product Guideline from the Drop-down Box Above.
Credit Risk Analysis

Financial Product
Agency 10 Year Fixed

Credit Score > 600
- Less Than $250k: DTI < 20% Approved
- $250k to $500k: DTI 20% to 40% Approved
- $500k: DTI > 40% Denied

Credit Score < 600
- Less Than $250k: DTI < 20% Approved
- $250k to $500k: DTI 20% to 40% Approved
- $500k: DTI > 40% Denied

Guidelines
credit
Run Simulation

Current Guideline Information
500
- dti = 43
- rate = 0.0425
- down_payment = 0.2
- ltv = 0.9

580
What’s left to do?

- Monte Carlo Simulation
- Choose Risk Metrics
- Develop algorithm to recommend eligible products
- Add Implementation for Two Other Loan Types
- Integrate AWS Backend into App
Questions?