PhilaForm: Increasing Accessibility of Philadelphia Tax Abatement Programs

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Abstract

Philadelphia's recent push to support new construction and rehabilitation projects has added value to many neighborhoods, but this has come at the cost of eviction of some lifelong residents. A variety of different tax abatement programs are currently being offered by the city, however, many residents are not accessing them, and in turn aren't able to pay their new increased property taxes and are being evicted from their homes. The process to determine eligibility and apply is complicated, leaving many residents incapable of doing this process without assistance. Community Legal Services (CLS), a Philadelphia-based Nonprofit Organization hosts a weekly clinic to help residents find applicable programs, but it is time-consuming to look through all 10+ sets of eligibility requirements and applications with each client.

PhilaForm addresses the core problems the CLS team and residents face, leveraging public data sets to simplify identifying candidates and answering eligibility questions. We use open-source libraries to parse through these data sets and populate application form PDFs. PhilaForm empowers individuals to be able to determine their eligibility for tax abatement programs and fill out the corresponding forms more easily and with greater independence from CLS.

1 Motivation and product high-level functionality

PhilaForm addresses the three core problems the CLS team and residents face. First, eligible residents are unaware the tax relief programs exist. Philadelphia has reassessed 579,000 properties since 2013, increasing the value of these homes. This reassessment immediately raises owners' yearly tax liability, regardless of whether the owner has the disposable income or savings to pay. This is especially burdensome on low-income Philadelphians and puts them at risk of losing their family homes, as defaulting on tax liability leads to fees and interest, and potentially to foreclosure. 102,789 of the reassessed homes collectively owe $515.4 million in delinquent property taxes (1). This suggests that there is a large population of residents that would benefit from these programs but aren't accessing them. Currently, the eligibility requirements and forms are all available online, but they are each located on a distinct website. To access the eligibility requirements and application forms, the user would first have to know all of the available programs, find each designated site, and then assess their eligibility individually for each program. There is no one site to access them all. Additionally, the target audience of these sites seems to be someone with a legal background - complicated technical terms are not defined, questions are often not clear, and any provided instructions are usually convoluted and confusing. As a result, determining eligibility is also a major problem as it is time consuming and complicated. Once an individual determines which programs to apply for, they are faced with having to repeatedly fill in their information across tens of pages of forms. Consequently, filling out the forms is also a lengthy and convoluted process that we identified could be streamlined.

We first address the lack of awareness about these programs by using data science to determine likely eligible individuals for specific programs from public data sets so that CLS can better target their services. We generate CSVs of the addresses of likely eligible properties so that CLS can send postcards with their information or decide to host a pop-up clinic in areas with a high density of likely candidates.

To simplify determining a given individual's eligibility, we centralize information to one place and

use a guided interview with a simplified set of questions. Where applicable, we use information from public data sets to answer eligibility questions that individuals likely do not know like year over year property tax increase. We then display the names of the exemptions an individual qualifies for.

To facilitate filling out the application forms, we populate forms with users information so that they only have to answer their personal questions once and these answers will be populated across all forms. These filled out forms are then displayed on the user's web browser as a PDF to be printed and sent in.

Individuals can access our site from their own home or local library as well as at CLS where law clinic advisors can provide additional help.

PhilaForm can be accessed currently at https://philaform.herokuapp.com/

2 Related work

The City has created a program that aims to provide similar services, but has significantly limited functionality that does not address any of these problems.

Currently, the city of Philadelphia has created a program, "Discover Benefits", that aims to provide similar services to that of PhilaForm (**?**). However, Discover Benefits, which the City has paid for and currently uses, has multiple drawbacks. Discover Benefits only includes Philadelphia-specific tax abatement programs, while PhilaForm includes additional state-wide programs for which applicants would also likely qualify. Additionally, Discover Benefits asks limited questions and accordingly does not tell citizens which programs they definitely qualify for, but rather just provides links to the programs they MAY qualify for, and then leaves the user to determine for themselves if they actually qualify for the programs. PhilaForm tells users which programs they definitely qualify for, and within the application asks all relevant questions to provide the user with completed application forms at the end, without requiring the user to leave the PhilaForm site once during the entire process. PhilaForm also helps users locate information they may not otherwise know or have ready access to, like the current value of their property, by pulling the data from available resources online and populating the form automatically for the user. Finally, PhilaForm differs from Discover Benefits in that it identifies individuals, based on recent property valuations, who would likely be eligible for the programs, with the aim that these individuals could be targeted by the City to advertise the programs.

3 Technical approach

For the data science component of PhilaForm, we created Python scripts and used the open source libraries numpy and pandas in a Jupyter Notebook to parse through public data sets. We generate lists of properties that would likely qualify for abatement programs. For example, we identify likely candidates for the Longtime Owner Occupants Program (LOOP) by calculating which homes have property taxes that have increased by 50% or more. These lists are used by the eligibility logic as an input value in determining a given individual's eligibility for the associated programs. These lists can also be used standalone by CLS to target their services to these individuals. We've further simplified identifying areas with a high density of potentially eligible individuals where a pop-up clinic might be useful by using the Google Maps API to create a heat map of these areas.

For the web-application component of PhilaForm, we used React.js and Python to develop the form question and decision tree structure. When users fill out questions to determine their eligibility, this information remains on the user's computer until the form is complete. Once complete, this information is sent to our Python server via GET section of the URL. The URL is naturally encrypted and thus secure. On the server, a Python script parses the given CSVs with additional eligibility information and loads this into an in memory cache to expedite matching addresses with their corresponding information. From the GET request, we parse and normalize the user-entered address using the open source package parse-address (8). Normalizing the address makes it such that extraneous information is ignored and the street names are uniform (ex. all typed West instead of W.). We are then able to display the programs the user qualifies for using a POST section of the URL which is also encrypted and secure.

The user can then fill in their personal information to populate the corresponding application forms for the programs they're eligible for. While for the city of Philadelphia, there are as many as 60 distinct questions that these forms ask, the first iteration of our site demonstrates how this works with the most used 10 questions. Users answer

these questions in a guided interview format and their information is sent to our Python server via the encrypted GET section of the URL. We made previously unfillable forms fillable using Adobe Acrobat Pro to add input boxes in the appropriate areas of the form and giving these input boxes names so that could be accessed systematically. We use the open source library pdfrw to assist in parsing through the input sections of the PDFs and entering information (9). Our Python server then generates a filled out version of the PDF which is then displayed on the user's web browser.

PhilaForm is hosted as standalone website, currently at https://philaform.herokuapp.com. The URL will shortly be transitioned to a subdomain provided by CLS to be philaform.clsphila.org.

4 Evaluation

We can confirm that our system reduces the time it takes to determine eligibility for users by conducting in-house user testing in cooperation with CLS. We can measure the time spent on determining the eligibility of each tax abatement client at CLS and determine an average. We can then time how long it takes users to determine their eligibility via our website by gathering anonymous timing data by storing a timestamp when a user initially starts the survey, and when the user is sent back their filled PDF. The difference of these times will give us the user's time to fill. We can compare these values to the time it takes for individuals to work with CLS. As a remote alternative to this, we have asked Johnathan Stein, our contact at CLS, to provide estimates about how long the process takes. Johnathan estimates that it takes him and other experienced attorneys about 25 minutes using current methods to determine a given client's eligibility. For law students and volunteer clinicians, our law student peers estimate that it would take them at least 30 minutes after a 3 hour training session. Without CLS's help, CLS estimates that an individual would need to spend about 5 hours to ultimately determine their eligibility for available programs. With a process that takes so long, individuals are likely to abandon this task part way through, never being able to find, understand or fill out all of the forms. With our system, users take an average of 5 minutes to determine their eligibility. This represents a decrease in time spent by CLS clients of more than 80%. For an individual who was trying to do this process without help, this represents a decrease of more than 95%. This decrease, specifically that for individuals trying to determine their eligibility for all available tax abatement programs without CLS, represents a likely difference in whether they ultimately apply to these programs.

Given more time, we can evaluate other metrics like time to locate program eligibility requirements and time to fill out applications. Because even finding these forms can prove difficult, we can give users a list of all the tax abatement programs and let them use the internet and other (non-PhilaForm) resources to find programs they could be eligible for. These users can then report back to us on how long it took them to identify all of these forms. We can also confirm that using our system makes filling out application forms easier. This can also be done with in-house user testing as well as remotely. We can time how long it takes users filling out applications via our website and compare these values to the time it takes for users to fill our applications with a pen and paper.

We can confirm that PhilaForm is helpful as 100% of homeowners that have volunteered to test our site have identified that they qualify for at least one exemption, many of whom didn't know previously that they qualified for one. From our set of volunteers, all have qualified for the homestead tax abatement. Based on property tax levels for 2020, this represents a $629 decrease in property tax for each home with a $45,000 exemption on total home value. The average home value in Philadelphia is $187,772 (12). Thus for the average resident, they should expect property taxes of about $2,630. The application of the homestead exemption would result in property taxes lowered to $2,000 which represents a 24% decrease. CLS clients typically have homes valued much lower than the average Philadelphia home, however, so this would result in an even greater percent decrease. For example, the owner of a home valued at $100,000 would pay taxes on $55,000 of that value, yielding an annual bill of $770, as opposed to $1,400 on the full amount. This represents a 45% decrease in property tax.

In neighborhoods that have been particularly affected by rehabilitation efforts and as a result have had their property value and property taxes increase by 1.5 times, they are eligible for the LOOP program. In 2019, the LOOP program saved homeowners an average of $1,300 (10). We've identified

that in neighborhoods like Point Breeze and Brewerytown there is a high density of properties that likely qualify for LOOP.

While the majority of our volunteer respondents largely didn't qualify for other programs, these individuals do not accurately reflect the typical CLS client profile as all of our volunteer respondents do not qualify as low-income. As a result, we expect our site to be even more helpful for CLS clients as they will qualify for a greater number of programs.

To make sure that the logic tree used for Philadelphia accurately identifies abatement programs that an individual is eligible for, we tested our program with a set of randomized data. To do this, we first created a set of test data with randomized values for address, income, and other details and gave this set to our team of law students to manually determine which programs the test individuals are eligible for. We then ran this data through our logic tree and made sure that the output values matched our expected output values. For our set of 50 test individuals, our logic tree correctly determined their program eligibility for all of them.

5 Societal impact

PhilaForm improves the accessibility of tax abatement and enables the CLS clinicians to work on higher level work, creating a butterfly effect of other positive outcomes.

PhilaForm enables Philadelphia residents to more easily file for abatement programs. By developing one form for individuals to determine their eligibility, we decrease the amount of time required and the complexity to determine eligibility. We also make determining eligibility easier for individuals who do not understand English by having available translations through Google Translate. We also empower residents to apply for themselves, without the help of CLS because the process is simplified. This sense of empowerment is important especially in areas where homeowners may feel vulnerable.

PhilaForm further enables CLS to save hours of robotic work helping individuals sort through and understand the tax abatement eligibility forms each week and instead focus their efforts on clients with more complicated needs or on clients who aren't as well served by technology-based options, like the elderly.

With tax abatement, residents have a greater opportunity to afford their homes. Greater levels of home-ownership and stable housing, have been shown to have lesser incidence of crime, improved educational performance of children, higher participation in civic and volunteering activity, and improved health care outcomes (7).

One concern regarding our project is that it could have the unintended consequence of overwhelming either CLS or the tax abatement programs. Our hope is that, since these tax abatement programs exist in the first place and CLS has been enthusiastic about the project, both will be able to handle the increased workload.

Another concern is that it will further disadvantage communities with language barriers, technology barriers, and unstable households where the public record holder might not be the best person to contact. Our primary goal in this project is to help CLS and their clients so that clinicians can spend their time where with residents who are in need of more complicated law help instead of mechanically guiding individuals through a web of forms. For individuals without access to technology or who have difficulty using a web-based tool, CLS is still available to assist them in filing for tax abatement. Through our data analysis component, we can help CLS identify residences that are struggling the most with their property taxes and those where their property taxes have increased the most and hopefully further alleviate the strain that these disadvantaged households are facing.

6 Discussion and lessons learned

Our primary goal is to simplify the eligibility determination process for tax abatement programs available to Philadelphia residents which we successfully achieved by creating a guided interview that determines which programs residents to apply for and directs them to apply for those programs. Our secondary goal is to use data science to help identify residents that may qualify for exemptions so that CLS could better target their services. We successfully accomplished this goal and identified properties whose property taxes have increased by over 50% for LOOP, as well as properties that are owned by an entity that is not a company or the city, not vacant lots, or residential zoned for the homestead exemption. In doing this, we realized that this information could be used to further simplify the types of questions we ask in the eligibility determination process. To further expand our project, we set to then help users fill out the tens of forms they may encounter once realizing all the tax abatement

programs they qualify for.

We initially tried to build off of existing PDF form filling logic, Documate but found that Documate did not have the capability to handle logic from multiple forms (4). As an alternative, we explored using Python library docassemble which also proved to be insufficient. (3).

Another challenge we faced was that many of the application forms are not currently available as a fillable PDF. As a result we had to use a free trial of Adobe Acrobat Pro to render these PDFs fillable. Additionally, many of these forms are not formatted such that they can be easily filled out using a fillable PDF because they use a box structure where each character goes into a specific box. This structure is not conducive to a text box because the characters don't align in the boxes unless they are separated and individually placed in boxes. For short inputs (2-4 characters) a single text box can be used without the characters straying from their intended placement however as inputs get longer, computer generated inputs stray farther from their intended placement. Now that we have created fillable PDF versions of these forms we will share them with government organizations and on our site. This is helpful for people that have trouble handwriting or may find it easier to type.

One challenge we did not have time to tackle was to improve the application form changeability. Currently, form changeability is feasible by reading through our step-by-step documentation and modifying questions and corresponding input values. Over the summer, we plan to create a GUI to change out forms for a given city to further facilitate updating forms when laws change.

We also plan to provide a cover letter already addressed to the correct city or state agency where applicable for certain programs. We plan to coordinate with our team of law students to write this letter and determine in which cases this should be included to further facilitate the application process.

With CLS's support, we plan to reach out to local Philadelphia government about linking our tool to foreclosure notices to increase awareness and help those that are most at risk of losing their home.

On a larger scale, we will reach out to other law clinics like Harvard's Legal Services Clinic, Drexel's Community Lawyering Clinic, and Columbia's Community Enterprise Clinic and help them set up a site for their community's respective tax abatement forms (6; 5). By starting with school-based programs, we believe we will have a greater adoption of our tool and can a greater level of collaboration with other organizations. By doing this we can expand to help law clinics be more efficient and individuals avoid foreclosure all across the country.

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