

# Large Scale Data Breaches: Keeping Personal Information Protected Online Using Web of Trust


Emma Brunell and Justin Ross

# Research


- There have recently been many large data breaches of companies in the past few years.
  - The Equifax and Facebook breaches have affected over 200 million Americans in total.
- In these data breaches, personally identifiable information (PII) has been released in an unencrypted, unsecure format.
  - Bank account details, medical history, social security numbers
- Hackers are motivated to create these data breaches because PII and other user accounts can be sold on the deep web.
  - Uber accounts are currently selling for \$1.15 USD per account, on average.



# Research

- Data brokers are companies who monetize user data and sell it to other corporations, including the government.
  - This user data is primarily used for a more personalized Internet browsing experience, and to show users advertising they might be interested in.
  - The largest data firm in the company, Axciom, has collected data on over 200 million Americans.
    - The trouble here lies with the fact that these data firms do not disclose exactly what information they are collecting on their users, only that they have hundreds of pieces of information on file per person.
  - Data broking companies tend to not have strong security protocols and are subject to XSS attacks and SQL injections.
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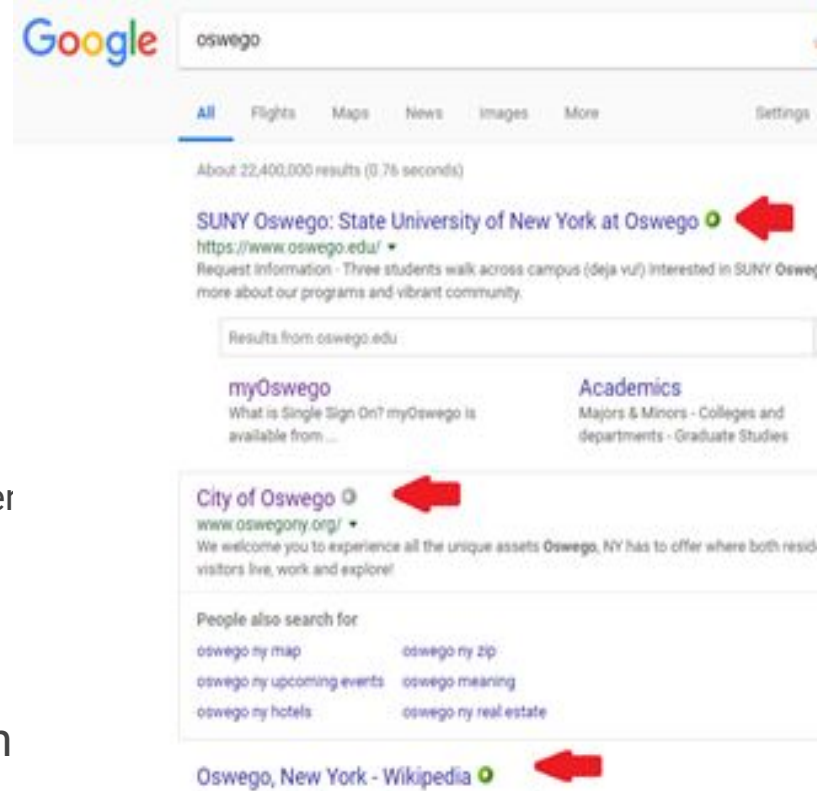
# Research

- The amount of information that is stored on each person who frequents the Internet is astounding.
  - So much information in one place - whether it is Equifax or Axciom - is a big target for malicious users.
  - It is important to educate users about the type of data that is likely being stored on them online.
  - Users can use the Web of Trust browser extension to verify whether the websites they are visiting are trustworthy or not before they input possibly sensitive information.
  - Creating a strong password is one of the best things an individual can do to protect their personal data.
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# Web Of Trust



- Free Open-source browser extension
- Works on all major browsers
- Website checker
  - Uses Machine learning and user reviews to determine the safety/trustworthiness of a website
- Read User Reviews
- Rate trustworthiness
- Shows trustworthiness from Search Engine



# Adding an Educational Password Cracker

- Passwords are the most popular way of user authentication
- Simplest way to break a password is the brute force method
- Web Of Trust does not have any way to educate users on the strength of their password



# How we added a Brute Force Password Cracker

- A python script was written that performs the brute force crack and returns the password and the number of attempts taken
- That python script accepts passwords containing every alphanumeric character as well as a set of special characters

Type in a password of 9 characters or less consisting of capital or lowercase alphanumeric characters and !@#\$%^&\*()-\_+=~";<>.,



# How we added a Brute Force Password Cracker

- That python script was run on a local Django server.
- The python script needed to be able to parse the HTTP request to get the query containing the password in question, and produce JSON that the Web of Trust extension can understand
- The Django server is only for development purposes, if this project were to be professionally implemented, a dedicated server would be used.





# How we added a Brute Force Password Cracker

- The open-source Web-Of-Trust code was modified to show the password cracker on the “ratings page”
- This page can be accessed by clicking the WoT donut in the top right
- The source HTML code was modified to display the addition
- A custom javascript file was added to make calls to the Django server and pass the results back to the web page





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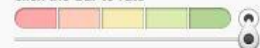
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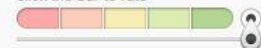


#### My rating

How much do you trust this site?  
click the bar to rate



How suitable is the website for children?  
click the bar to rate



Your activity score is now 0. Keep on rating to reach **bronze** level!

#### WOT users say

Trustworthiness



- Good site
- Online tracking

[View details and comments](#)

Child safety



- Other

#### Brute Force Password Cracker

This is a purely educational tool. DO NOT use a real password.

Type in a password of 9 characters or less consisting of capital or lowercase alphanumeric characters and !@#\$%^&\*()-\_+=~`';<>.,

Crack

Password:

Number of Attempts:

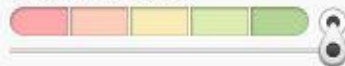
Zip code: 13126

Population: 17,599 (2016)

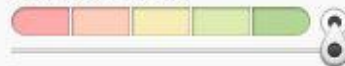
[Plan a trip](#)

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Crack

Password:

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# Cracking Examples

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Trustworthiness



● Good site  
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● Other

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Password:

red

Number of Attempts:

127432

# Cracking Examples

## WOT users say

Trustworthiness



● Good site  
● Online tracking

[View details and comments](#)

Child safety



● Other

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Password:

blue

Number of Attempts:

1271849

# Cracking Examples

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Child safety



● Other

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Type in a password of 9 characters or less consisting of capital or lowercase alphanumeric characters and !@#\$%^&\*()-\_+=~`~;<>.,

Password:

b!U3

Number of Attempts:

1633940

# Cracking Examples

- When the program is decoding, it has a little indicator that informs the user that work is being done

## WOT users say

Trustworthiness



- ☒ Good site
- ☐ Online tracking

[View details and comments](#)

Child safety



- ☐ Other

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Cracking

Password:

Number of Attempts:

# Takeaways

- The length of a password increases it's security.
- Adding capitals and special characters can help also
- Do not use the same password for every site
- Most password crackers are algorithm based, and will detect patterns better than brute force

