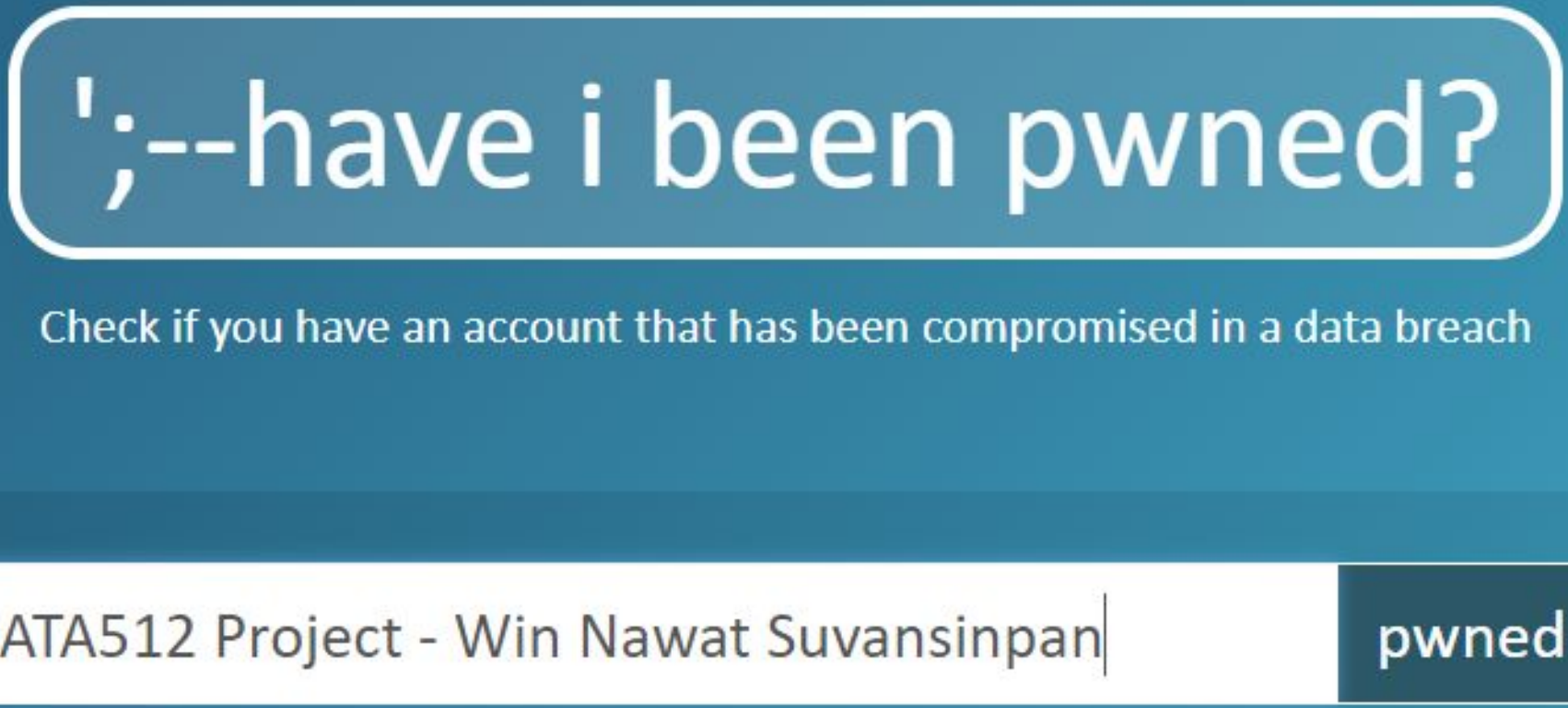


https://haveibeenpwned.com/ - Troy Hunt

Dataset - passwords that have been compromised

- Pwned passwords sorted by count. Collected by Troy Hunt from data dumps. As new dumps happen, new passwords are added, existing passwords have their counts incremented.
- 2 versions
  - July 2019
  - July 2018
- Subset the first 10,000 rows for each version to meet Github size cap.
  - 1M rows attempt did not end well.
- Data is released without license. Written permission is granted.

	hash	count
0	7C4A8D09CA3762AF61E59520943DC26494F8941B	23547453
1	F7C3BC1D808E04732ADF679965CCC34CA7AE3441	7799814
2	B1B3773A05C0ED0176787A4F1574FF0075F7521E	3912816
3	5BAA61E4C9B93F3F0682250B6CF8331B7EE68FD8	3730471
4	3D4F2BF07DC1BE38B20CD6E46949A1071F9D0E3D	3120735

Goals

- An exploration on the patterns of vulnerable passwords.
  - Categorizing them.
  - Investigate changes their “popularity” over the past year.

- An exercise on working with sensitive data without revealing them.

Hypothesis

Hypothesis

- Majority of vulnerable passwords belong to the following categories:
  1. Keyboard walk (“asdfghjk”, “qwerty”)
  2. Dates (“12052019”)
  3. Dictionary attack (“password” “admin” “welcome”)
     i. wordlist compiled by Openwall.com
     a. Licensed for use and redistribution.

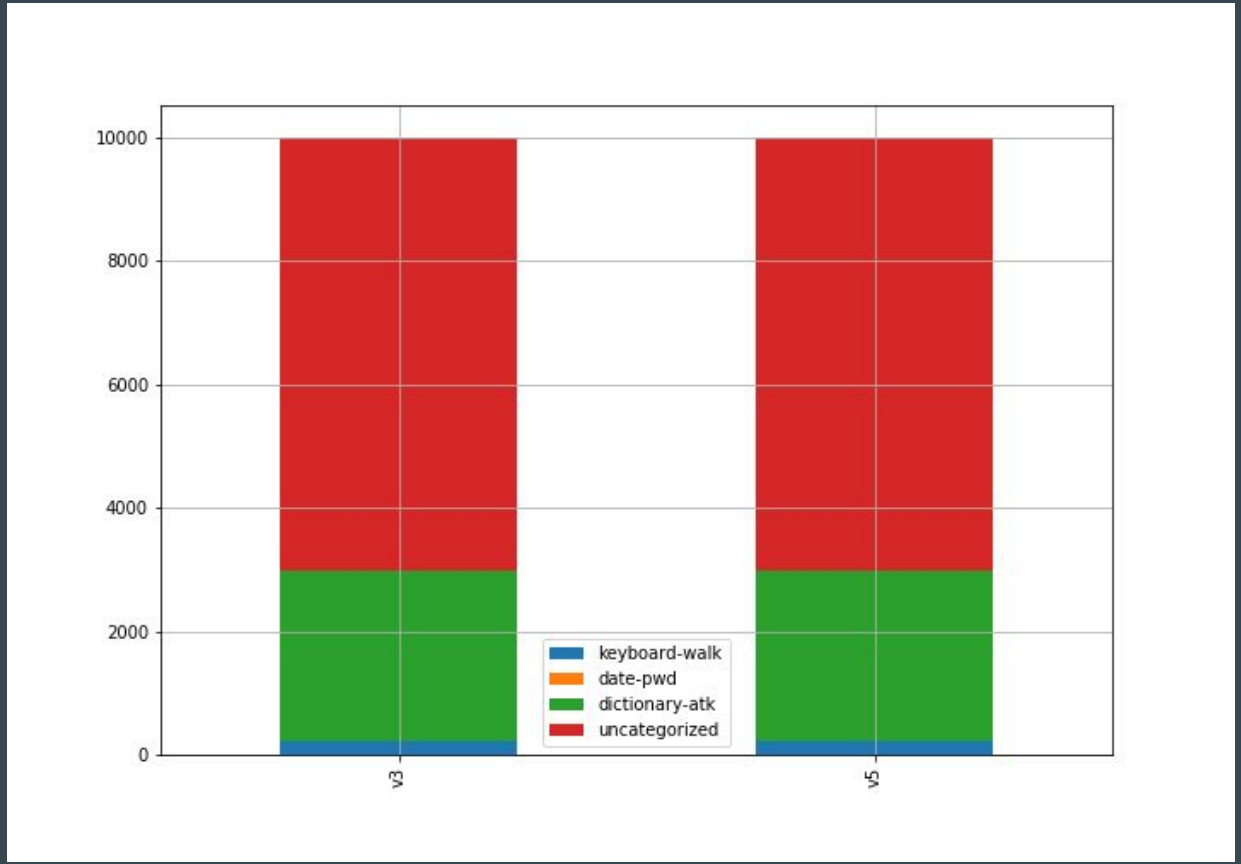
Questions

- What is the proportion of the passwords that can be classified under the categories above?

- How do the counts of the different categories of compromised passwords change within a year? (Greater awareness on cybersecurity!)

Results

- Underwhelming!
- Dictionary attacks cover about ~30% of the top 10,000.
- Keyboard-walk passwords are still in progress.
- (4-6 characters)



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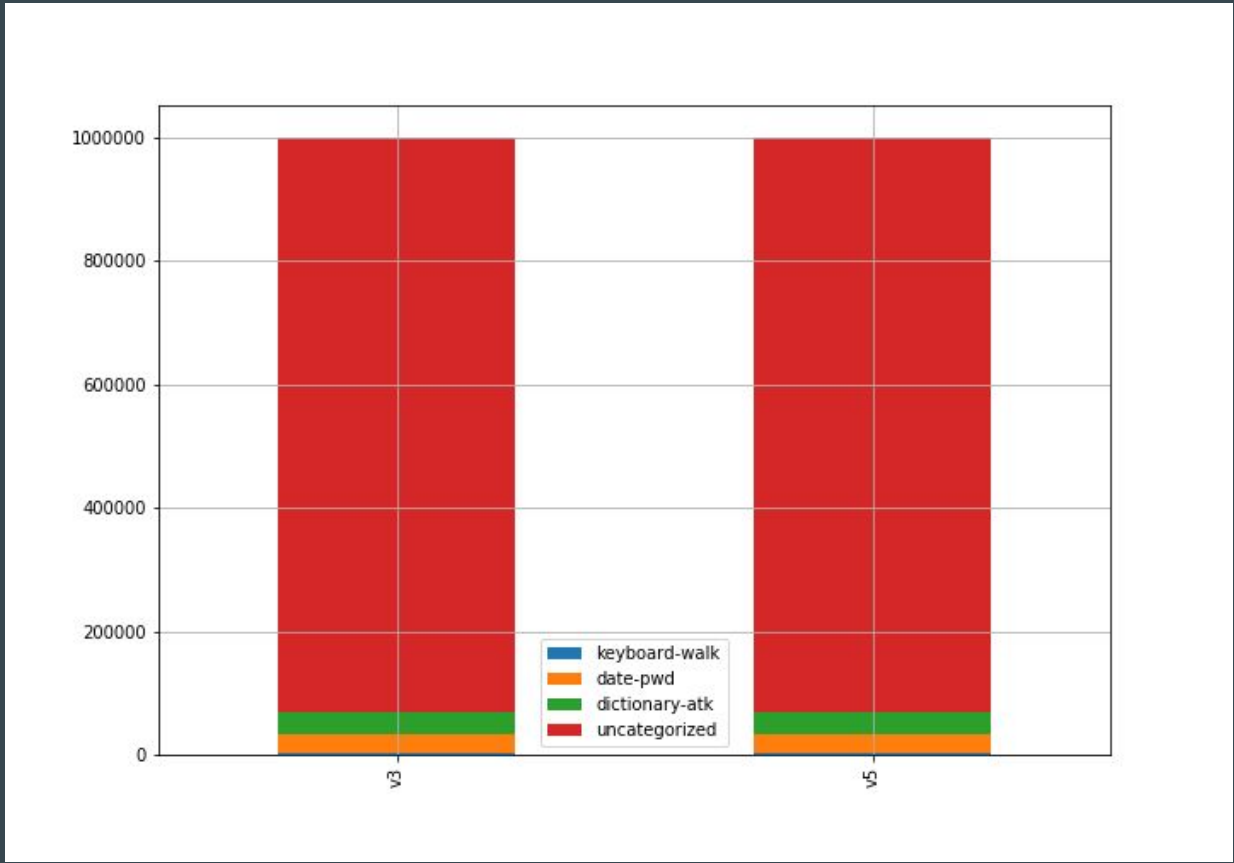
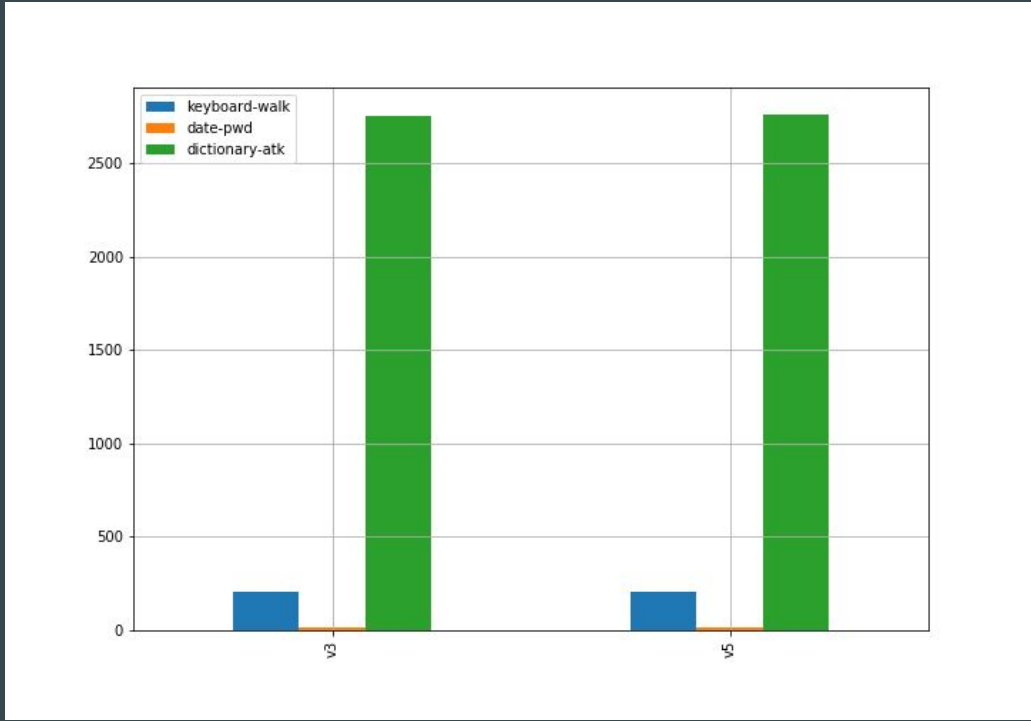


Results

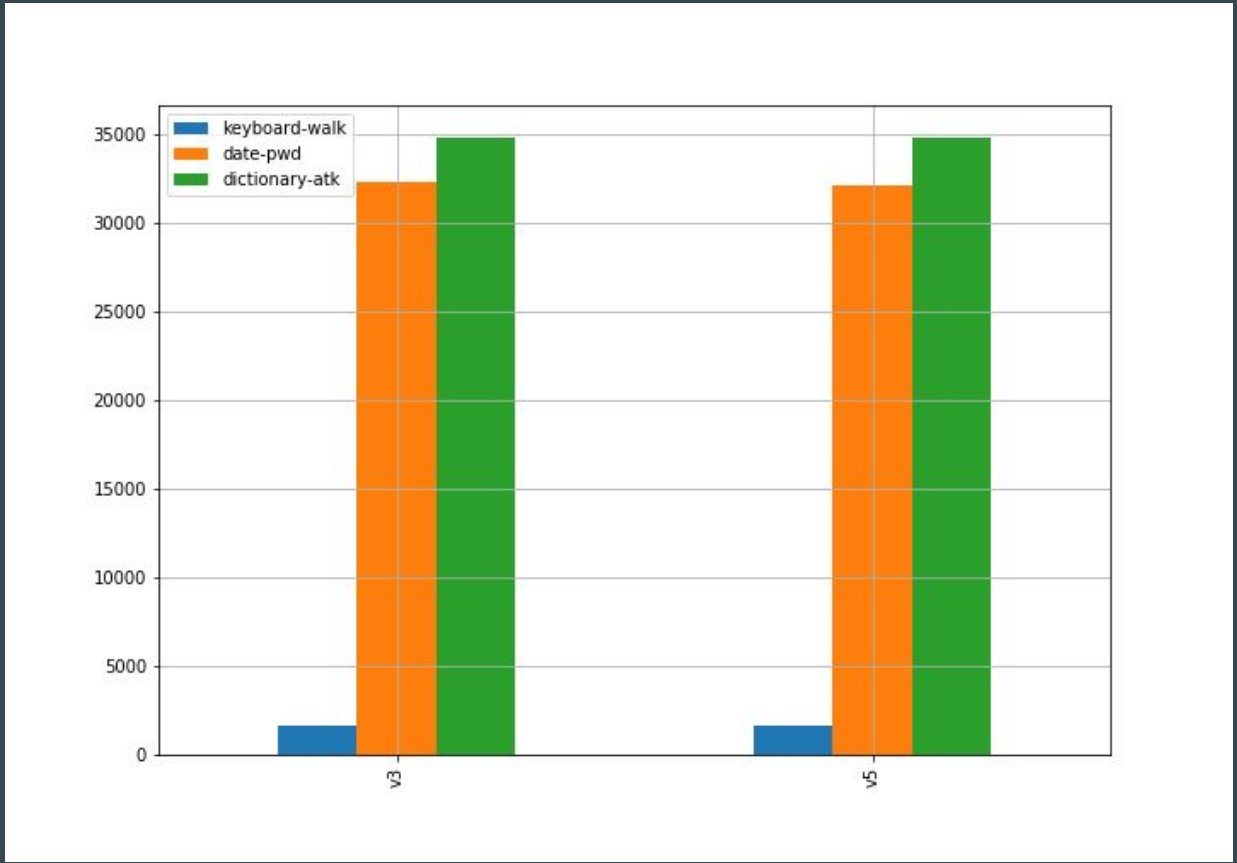
Just the uncovered passwords.

- Dominated by dictionary attacks.
- Date-format passwords are almost non-existent.
- No clear trends.
- BUT! Count is cumulative.
- Weak passwords are likely to remain on the list.
- To further look at the count delta between v3 and v5.



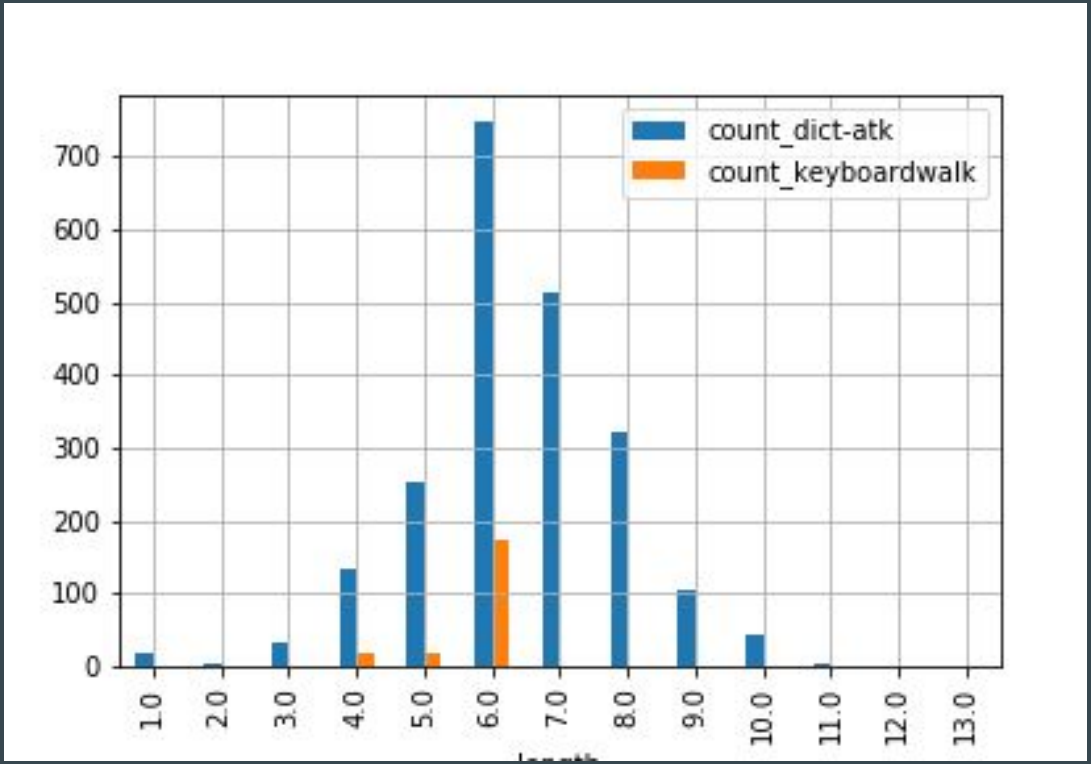
Results

- Just the uncovered passwords
- Some small decrease in count is observed.
- Means compromised passwords are more complicated



Results (bonus)

- Histogram of password length by categories.
- Random walk passwords: only length 4-6 are considered so far.
- “Date” type of passwords are omitted. They are always 8 characters long!



Results (bonus)

- Histogram of password length by categories.
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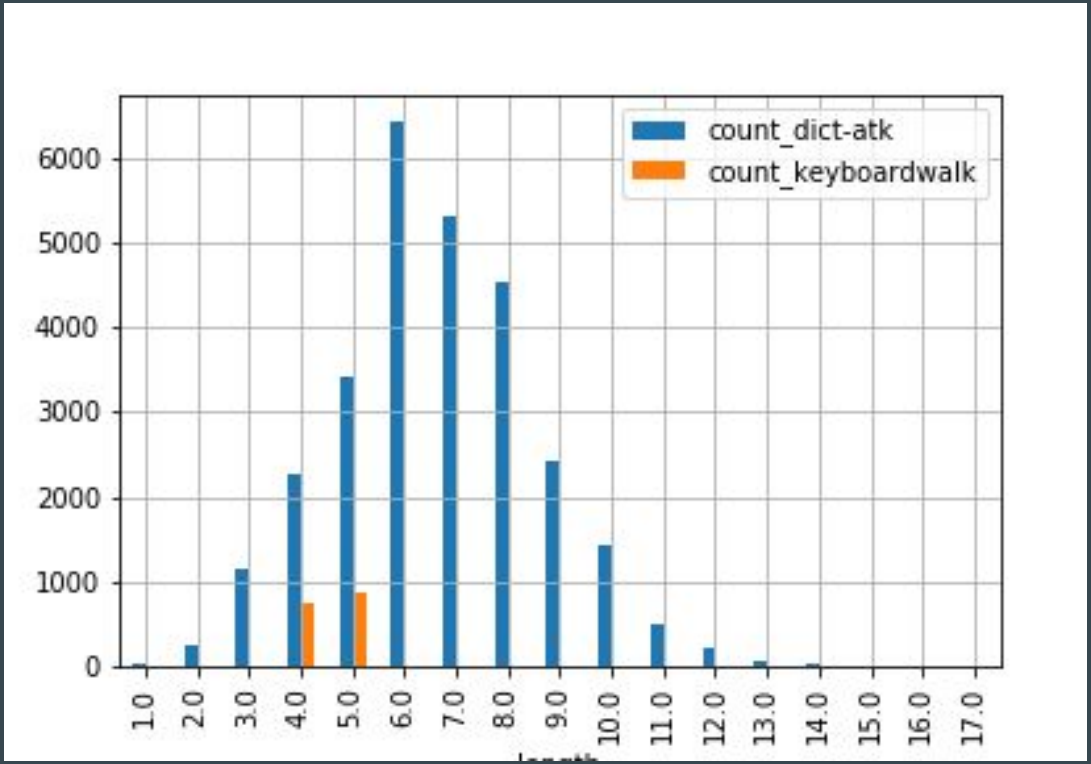

Conclusions

- The leaked passwords are unexpectedly complex.
- No noticeable movement in each type of passwords.
- Dictionary attack appears to be the most effective so far.
- Most common length of compromised password is ~6.
- Length of the password increases entropy exponentially, making brute force attacks REALLY hard. (First hand experience)