Abstract

Password is needed to create an account in most of the websites. Each website has different password and authentication policy when making an account. In addition, each country has different trend of policy in making the passwords. There are many researches about strong password and usable password. However, when it comes to practical, real world cannot adapt strong and usable password policy. South Korea is known for IT(Information Technology) and assumed to be secured in cyber space as well. However, South Korea has many problems regarding the leakage of accounts due to the password hacking. Countries beside Korea also may have analogous situation, but they may have different policies compare to Korea. Therefore, this study generally compares Korean websites’ password and authentication policies and other 5 countries’ policies by gathering policies from Alexa website and suggests recommendations.

[Keywords] Private Security, Password Policy, Authentication Policy, Korean Password Policy, Password Strength

1. Introduction

Password is a text composed of characters and symbols. It is mostly used to identify and access our account. In other words, password is usually created when making an account in a website. Each website has different policies in making the password. There are many researches about strong password and usable password. However, when it comes to practical, real world cannot adapt strong and usable password policy. South Korea is known for IT(Information Technology) and assumed to be secured in cyber space as well. However, South Korea has many problems regarding the leakage of accounts due to the password hacking. Countries beside Korea also may have analogous situation, but they may have different policies compare to Korea. Therefore, this study generally compares Korean websites’ password and authentication policies and other 5 countries’ policies by gathering policies from Alexa website and suggests recommendations.

In this paper, we compare the password policies and authentication policy from 6 different countries. Through the comparison of the policies, we explain the result and suggest recommendation for better and usable policy for South Korea.

The contributions of this paper as followings:

- Referring to the ‘Alexa’ website, a vast amount of data of password policy is collected
- Data are transformed into numerical values for accurate comparison

various policies, websites turn out to have similar policies from the same country and this show the policy trend from a country.
Results from comparison show the trend of a country password policy and authentication policy.

Suggest recommendation of better password policy for Korea from other countries.

In section 2, we present the method of the research. It shows which features were used to evaluate the policies and from where the data was gathered. Next, we explain and discuss about the result according to the Tables and a Figure. At last, in section 4, we conclude the paper.

2. Methodology

‘Alexa’ website[3] presents the rankings of the most visited site for each country around the world using the traffics. In this paper, total of 147 websites’ password policy from 6 different countries were gathered as shown in <Table 1>. <Table 1> shows the list of the websites categorized by countries that has been used for this research. At the country name column, it also includes the information of the common end at the DNS such as .com, .net, and .co.kr.. Moreover, at the list of the websites, total number of gathered data and the number of websites which have the password policy are also mentioned. The countries mentioned in the paper were America, Japan, Germany, India, China, and South Korea. We tried to gather the data from various continents in order to see the trends outside from South Korea as well.

Moreover, ‘Alexa’ shows 100 web pages for each country, and we chose websites which are from that country. For example, Japan’s most visited website is Google, however, we excluded Google since it is not originated from Japan itself. In addition, porno, malicious pages were also excluded from the data. Furthermore, out of 147, 24 websites were excluded because its websites were unable to create an account which means that there is no password policy. This paper uses the policies from most visited site which means that this also represents the trend of a country’s policy.

The websites were grouped by countries. We evaluated the password policies(First factor authentication) of each country and comprehensive authentication policies of each country. First, to find out the password policy of each website, we evaluated 8 features by creating an account. The 8 features were as followings:

- HTTPS
- Minimum Character
- 3class8
- Symbol
- Upper letter
- Digit
- Common/easy words
- Password meters

We marked each feature 1 or 0 that cannot be expressed in numbers. If the feature in the policy satisfies, we marked 1 and marked 0 if not. Https[4] is to show the secureness in the transport layer. If the address of the website includes https, we marked it as 1. Minimum character means the condition for the length of the password. To be specific, it defines the least amount of characters to create the password. 3class8 refers to the condition that satisfies 3 of the followings(uppercase letter, lowercase letter, digit, symbol) and 8 minimum characters. Common and easy word means for the requirement that blocks the common and easy words such as ‘apple’, and ‘aaa’ in the password. Lastly, the password meter feature is the existence of the meter bar showing how safe the created password is. Password meter is a real-time feedback on how much your password is strong[5][6]

After evaluating the features of the webpages one by one, we calculated the average of each feature. Next, to find out the comprehensive authentication policies, we analyzed the characteristics of each country. A process of creating an account from each website was needed to find out the policies.
Table 1. List of the websites by countries.

<table>
<thead>
<tr>
<th>Country (common-end)</th>
<th>Website (Total number / Number of password policy existing webpage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>America (.com, .tv)</td>
<td>Facebook, Twitter, Instagram, LinkedIn, Reddit, Google, Yahoo, Bing, Amazon, Ebay, Apple, Microsoft</td>
</tr>
<tr>
<td></td>
<td>Netflix, Twitch</td>
</tr>
<tr>
<td>Japan (ne.jp, co.jp, .com)</td>
<td>Nicovideo, Rakuten, Fc2, Kakaku, Ameblo, Live door, Hatena, Weblio</td>
</tr>
<tr>
<td>Germany (.de, .net)</td>
<td>Onlinesbi, Flippkart, IndiAtimes, Incubank, Icibank, Rediff, Naukri, Imdb, Jabong, Newstrend, Cricbuzz</td>
</tr>
<tr>
<td></td>
<td>T-online, Spiegel, Bild, Focus, Otto, Idealo, Web, Gmx, Postbank, Welt</td>
</tr>
<tr>
<td>India (.com, new.s, gov.in)</td>
<td>Nettv, Sarkari result, Paytm, Oncliks, Billdesk, Ulidai</td>
</tr>
<tr>
<td>China (.com, .cn, .net)</td>
<td>Baidu, Tmall, Qq, Taobao, Sohu, Dina, Jd, Weibo, 360, So, Tianya, Zhihu</td>
</tr>
<tr>
<td></td>
<td>Douyu, Mama, China, Huanqiu, Bilibili, People, Aliyun, Alipay, Csdn, Youth, Xinhuanet, Sogou</td>
</tr>
<tr>
<td>South Korea (.com, .co.kr, .net, .in, .g, o.kr, .tv, or.kr)</td>
<td>Cyworld, Sayclub, Saramin, Job-ko rea, Albamon, Alpa, Ppomppu, Chol, Todayhumor, Clen, Juxum onitor, Tason</td>
</tr>
<tr>
<td></td>
<td>Marumar, Egloos, Nate, Daum, Naver, Zum, Moneta, Gmarket, Store-.emart, Homeplus, Coupang, Logii</td>
</tr>
<tr>
<td></td>
<td>11st Auction, Da-nawa, Interpark, Epost, Korail, Kakao, Starbucks, Kitri-bob, Kt, Uplus, Twoorld</td>
</tr>
<tr>
<td></td>
<td>Gsnetteal, Lpoint, Okcashbag, Cjone, Africana.tv, Gomtv, Pandora, Donga, Joins, Mk, Seoul, Chosun</td>
</tr>
<tr>
<td></td>
<td>Kbs Sbs, Imbc, Nexion, Pmang, Netmarble, Hanguame, Filejo, Ondisk, Filecity, Fileham, Sharebox</td>
</tr>
</tbody>
</table>
|                      | Ebs Homekepc, Pyeongchang2018, Qnet, Shinhan, Rankey, Ahnlab, Wooribank, Ibk, Kistars, Bank- 
ing.nonghyup | 71 / 67 |
3. Result

3.1. Password policy

Result of the password policy is as shown in Table 2. The country which uses https the most is America. From the websites we experimented, every website had https for America. South Korea has 75% of https webpages which is at 3rd ranking among 6. Japan has only about 28% of https which is the last standing.

Second, the longest letter requirement for password is Germany with average of 7.33 letters. South Korea is next which is 7.16 characters. The rest of the countries have less than 7 characters in average. The last standing country is China.

Moreover, the country which has the highest percentage of adapting 3class8 policy is India. South Korea is next, and the average is about 48%. There are countries that do not adapt the 3class8 rule such as Germany, Japan, and China.

Next, South Korea required symbol in their password as mandatory 48% in average. There are not many websites that need the symbol as mandatory. The highest country which required digit in the password is Japan in average about 85%. This policy has wide range from 0% to 85%. Most countries mostly have low percentage, however, South Korea have approximately 80% which is the second ranking. The number of websites that block common words when creating a password is low overall. Among the 6 countries, South Korea had the highest average about 39% in average.

Lastly, the country with highest percentage of having password meter bar is Germany about 83% in average. Other than Germany, most countries have low percentage with password meter bar. South Korea has about 32% in average which is second last standing among 6.

In conclusion, overall strength of the password can be acquired by the average of the 8 factors. As a result, South Korea has the highest average compared to 5 other countries. It can be seemed that South Korea has the safest password policy. However, having the safest password policy does not mean that it is safe and usable. Safe and usable are tradeoffs which are the reason the policy should be well-made. There are better factors which are more convenient to use and make a safer policy than now from other countries.

Table 2. Evaluation of the password policies (First Auth. Factor) for each country.

<table>
<thead>
<tr>
<th>Country</th>
<th>America</th>
<th>Japan</th>
<th>Germany</th>
<th>India</th>
<th>China</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTPS(%)</td>
<td>1</td>
<td>0.285714286</td>
<td>0.833333333</td>
<td>0.9</td>
<td>0.526315789</td>
<td>0.75</td>
</tr>
<tr>
<td>Min. Ch(num)</td>
<td>6.785714286</td>
<td>6.714285714</td>
<td>7.333333333</td>
<td>6.8</td>
<td>6.421052632</td>
<td>7.161764706</td>
</tr>
<tr>
<td>3class8(%)</td>
<td>0.142857143</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>0.485294118</td>
</tr>
<tr>
<td>Symbol(%)</td>
<td>0.142857143</td>
<td>0.285714286</td>
<td>0</td>
<td>0.4</td>
<td>0</td>
<td>0.485294118</td>
</tr>
<tr>
<td>Upper(%)</td>
<td>0.142857143</td>
<td>0</td>
<td>0.166666667</td>
<td>0.4</td>
<td>0</td>
<td>0.088235294</td>
</tr>
<tr>
<td>Digit(%)</td>
<td>0.214285714</td>
<td>0.857142857</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>0.808823529</td>
</tr>
<tr>
<td>Common(%)</td>
<td>0.285714286</td>
<td>0.142857143</td>
<td>0.166666667</td>
<td>0</td>
<td>0.526315789</td>
<td>0.397058824</td>
</tr>
<tr>
<td>Pwd Meter(%)</td>
<td>0.357142857</td>
<td>0.285714286</td>
<td>0.833333333</td>
<td>0</td>
<td>0.526315789</td>
<td>0.323529412</td>
</tr>
<tr>
<td>Average</td>
<td>1.133929</td>
<td>1.071429</td>
<td>1.166667</td>
<td>1.1875</td>
<td>0.940789</td>
<td>1.3125</td>
</tr>
</tbody>
</table>
3.2. Comprehensive authentication policy

There are many countries overlapping America sites such as Google, Amazon, YouTube, etc. in the ranking in Alexa. This is because those sites mentioned above are especially more popular and well service providers. During the experiment, overlapped sites were removed and only sites made from their own country were left. As a result, there is a distinction between countries where some have willingness to use websites that are popular web services and others that uses their own. In the case of a country with the willingness, it can be said that they follow American password policies. For instance, India and Japan are the countries which use America websites rather than their own made web services as shown in <Table 3>. <Table 3> shows the summary of the common and distinct characteristics of each country.

In America, when creating an account, the process is relatively simple. It depends on which kind of the service the website provides, but relatively low-sensitive service does not require difficult and complex password. In addition, password policy requirements are also not tricky, which is an advantage when gathering new users. However, this could be targeted to be attacked due to the easy process[7]. To overcome the problem, if the account is determined to be too easy after registration or the change of the password, the user will be continuously requested for an additional authentication factors or password changes. This policy is followed by the guidelines from NIST released in 2017 which enables to create password more easily and flexibly[8].

Similarly, in Germany, the password policy is easy and the process to register is convenient. However, to protect from the attacks some sites refuse to register as shown in <Figure 1> because of the IP addresses’ location. Only IP addresses from Germany or countries near Germany such as Swiss are allowed to register. Therefore, regarding Germany’s password policy and security policy, Germany accepts users depending on the area.

In the case of China, it was one of the countries that did not depend on the popular web service sites. It can be seemed as China’s own security and password policy, but it can be also said that China’s password policy is vulnerable. Compared to other countries, there is no prevention for relatively simple characters such as ‘aaaa’ and short password length like 3 characters total. However, in order to cover the weakness, most sites in China have a secondary authentication factor such as mobile or email.

On the other hand, in India, it is the country which is most dependent on the American websites. Many websites are able to sign up through account synchronizing with Google or Facebook. The reason for this is convenience. This trend shows that India is also following American password policy. However, password policies that do not synchronize are relatively weak. Allowing common word password and absence of the password meter bar present that passwords can be easily created without the second authentication. In addition, India has a number of websites that do not require registration at all compared to other countries. Therefore, it is convenient to acquire information from the website.

Equivalently, in Japan, it seems to depend on the American site as well. Many sites from the ranking in Alexa were American websites. It represents that Japan also follows the American password policy. However, there was one other feature on the Japanese web-

Figure 1. German website declining registration.
site different from other 5 countries. Secondary authentication factors in other countries mostly are mobiles or emails. In Japan, however, there are relatively many websites that require image authentication as second authentication factor.

Finally, in South Korea, it is one of the countries that is relatively unaffected by the American websites like China. There are many self-produced websites, and the safety of the security is compared from the others. In the area of P2P and community websites, security of password is relatively weaker than the well-known portal site or service web site in Korea. South Korea password policy is safer compared to other countries, but it gives high burden to the users[9] during registration. The length of the password and the use of 3class8 are also considered the highest among the 6 countries, and the process of identity verification for the secondary authentication factor is also applied to most websites.

Table 3. Comprehensive policies of each country.

<table>
<thead>
<tr>
<th>Country</th>
<th>Characteristic</th>
<th>Willingness to use American websites</th>
<th>Strength or Weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>America</td>
<td></td>
<td></td>
<td>Keep contacting user if the password is weak</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>Have dependent on American websites</td>
<td>Uses image authentication as 2nd authentication</td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
<td>High rate of websites uses synchronization to Google or Facebook to create account</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>-</td>
<td>Must be located near Germany to create an account</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td>Prefer using self-produced websites</td>
<td>Some websites have very poor password policy</td>
</tr>
<tr>
<td>South Korea</td>
<td></td>
<td></td>
<td>Safe password policy but inconvenient</td>
</tr>
</tbody>
</table>

3.3. Recommendation on policy

South Korea password policy is the safest policy among the 6 countries. However, researches have shown that current password composition policy does not mean it is the best. There are tradeoffs between complex in password and convenient[10]. Due to the reason that the safety of the password policy is strong, it could also make a phenomenon which is difficult and inconvenient when creating the password. To overcome the disadvantage, modifying the authentication policy could increase the safety and comfort during the registration.

To make South Korea to have better authentication policy, using and adapting other countries’ policy is helpful. South Korea has the guidelines for creating password[11]. However, it has not been updated since 2010 which requires adaptation of current situation. During the process of creating an account, South Korea has quite uncomfortable
time because of satisfying the password requirements. To simplify the process, at the first stage of making an account, website should not require difficult requirements and let users decide to make it difficult. In addition, when changing the password it is predictable when changing the password after the first password[12] because usually users change the password to similar one. Therefore, like America, if the users’ passwords are determined to be simple or similar to the past password, contacting directly to change the password more complex would make users more convenient during the registration and keep the password safe.

Moreover, implementing image authentication as second authentication factor like Japan would be a simple and fast way to make safer and expedite the registration. Currently, most of the websites use mobile number which takes a long time to verify the user.

Lastly, if the websites’ need or users are mostly from inside the country, blocking IP addresses from outside the country can make much safer like Germany. There are many malicious attacks made by hackers outside the country. However, with this policy, it would be better to reduce the ranges of attackers dramatically.

4. Conclusion

In this paper, we compare both password and authentication policies from 6 countries, and 147 websites from ‘Alexa’. Among the 6 countries, South Korea had the safest password policy. However, since the password policy makes the account registration difficult and inconvenient, we suggest letting the user to decide the password themselves, implementing image authentication as second authentication factor, and blocking IP addresses that are outside of the country. Further research is needed to accurately analyze the authentication policy because the analysis of the policy was based on empirical events not numerical.

5. References

5.1. Conference proceedings


5.2. Additional references


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