A Framework for Illegal Online Loan Risk Using Word Cloud and Big Data Analytics

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Abstract— **Information technology has provided many conveniences in community activities. Big data on the Internet benefits many things, especially risk information that occurs without being careful in conducting transactions and credit activities online. This study analyzes online credit risk using ten variables related to online credit risk. The data set used in this paper is sourced from the Internet by using keywords that have been determined using the Uniform Resource Locator (URL) from different websites. The research method used in this study is an experimental method by classifying word variables related to online credit risk through data collection, initial data processing with a word cloud generator, and data analysis with python programming, then evaluation and validation of results. Variables analyzed such high loan interest, small loan ceiling, personal data in the App, old approval, the collector is coming, administrative costs, not yet registered with the OJK, unofficial loan institutions, consumer data protection, and cost transparency. Data collection techniques by means of questionnaires were carried out to online loan money borrowers to explore more in-depth information. The results of the analysis that has been carried out with the python programming language using the pandas, matplotlib, and seaborn libraries produce the Small Loan Ceiling variable, which greatly influences the consumer data protection variable with a value of 0.99. An in-depth analysis of these variables found that credit with a ceiling is ineffective.**

Keywords— **Online loans; big data analytics; word cloud; risks.**

I. INTRODUCTION

The ease of access to communication with internet media has provided opportunities for people to do many activities on technology [1]. The Internet is growing very fast, especially in developing countries like Indonesia. Activities in the use of the Internet have become necessary for individuals and communities, so fundamental knowledge is needed so that internet use activities become helpful [2]. The incredible benefits of the Internet provide competence and freedom to all individuals and people in the world and make the Internet an essential human need today and in the future of civilization [3]. Communication with the Internet is important in minimizing gaps in many ways [4]. The ability of individuals and community groups related to online loan applications on the Internet makes it easy to carry out activities. Financial activities to borrow and lend with applications are overgrowing in Indonesia. The borrower's relationship with the lender is done with Internet connectivity. The importance of knowledge in managing finances also needs to be improved, especially for the lower middle class. Knowledge becomes the basis of sensory input [5]. Online lending activities give us the latest perspectives that require a new way of thinking [6]. Education becomes the main thing in increasing knowledge, and open access to education for all communities becomes essential [7]. The data and information available on the Internet with big data technology provide broad access to the level of society. Analysis with data can be carried out on small data samples to extensive data [8].

Internet connectivity and Big Data technology are essential processes in improving data and information services. Online loans that are widely available provide convenience to the public to borrow money and make other transactions with application services. Financial transactions can be conducted domestically or cross-country. Public knowledge of financial

management can be an investment for the future. Financial management has differences in every household [9]. The ease of using online loan service applications often harms the community. As an external entity service, online loan applications integrate a wide variety of user resources protocol [10]. The public has not comprehensively understood online loans' risks and a dark side, especially illegal ones. The use of technology in the financial sector or financial technology (fintech) becomes essential in supporting digital transformation [11]. Financial transaction activities such as online loans are heavily influenced by reputation systems [12]. Illegal online lending affects the activities of online loans that are authorized and registered with government agencies. The problem of a short time in borrowing money online affects the number of individuals who make loans and experience failure in paying a loan [13]. Not evenly distributed public knowledge about online loans, especially illegal ones, burden their finances with a reasonably high-interest rate. High-interest risk needs to be studied by individuals when going to make money loans to online loan applications. Individuals and communities need to be protected from applying high-interest rates. The use of high-interest rates by illegal online loans can be detrimental and have long-term effects [14]. Information related to the impact of adverse risks on online money borrowers is still not a concern for the community. Online loan application owners certainly have personal information that correlates with many things [15].

Many people have not been careful and careful in applying for online loans without verifying related legal and illegal online loan applications in advance. Legal considerations need to be considered in the context of borrowing and lending money to individuals and communities to avoid sensitive things in the future [16]. This study aims to analyze online loan risk models using big data contained on the Internet. Big data is now a big issue globally because big data can be used in many sectors [17]. Analysis with Big Data is essential in the early stages of research, and productivity and efficiency can be done with Big Data [18]. This study provides innovation for the community to use Big Data on the Internet to increase knowledge and raise public awareness about the risks and the dark side of illegal online loans that harm people's economic activities.

The role of Big Data on the Internet can help people choose legal online loans. The Big Data Analysis Process is widely used in many fields [19]. Education to the public is essential in avoiding money loan offers through online loans, especially illegal loans. Policymakers need to improve the expansion and addition of public sector jobs. This needs to be done to reduce individuals and communities using illegal online loans [20]. The dark side of illegal online lending must be disseminated so that individuals and the public receive information through short message services and WhatsApp to be avoided and ignored only. Individuals and society need useful information to carry out economic and other activities. Information [21]. Today's information is essential in supporting business activities in many strategic sectors, and information is also used in formal and informal fields at all levels of education.

II. MATERIALS AND METHOD

A. Uniform Resource Locator (URL)

Uniform Resource Locator is an arrangement of characters with a particular format and has certain standards. Uniform Resource Locator refers to specific characters and symbols, usually numbers, letters, and symbols, which go to a site on the world wide web (www). URLs are used in identifying the place of a file on the Internet. URLs are used to open a website, but they are also used to download videos, images, hypertext pages, etc. The advantage of URLs is high-speed web access, which happens because only one string is processed according to your needs [22].

B. Word Cloud Generator

Visual representation of text data to illustrate keyword metadata can be done in various ways, such as WordCloud. WordCloud can perform the visualization process of text data on the website/site. WordCloud can perform descriptive and regression analyses to find new knowledge [23]. Classification with keyword metadata categories can be done as the initial process of comparing the methods used [24]. WordCloud representation by using websites/sites in the database is the process of digging data into information [25]. WordCloud is commonly used to study word relevance in document sets [26]. In this paper, we exploit and represent words related to the risk of illegal online loans, such as high loan interest, small loan ceiling, personal data in the application, old approval, the collector is coming, administrative costs, and not yet registered with the financial services authority (OJK), unofficial loan institutions, consumer data protection, cost transparency.

C. Big Data Analytics

Big data is a collection of data stored in many databases with substantial sizes. The size of big data can have a capacity of terabytes and even petabytes. Like data in general, big data certainly requires big data analytics. Big data combines unstructured, semi-structured, or structured data collected by organizations. This data can be mined for insights and used in machine learning projects, predictive modeling, and other advanced analytics applications to gain new knowledge. Big data analytics is extracting useful information by analyzing different types of large data sets. Big data analytics is used to find hidden patterns, market trends, and consumer preferences for the decision-making interests of an enterprise. Big data is also a series of different types of applications that develop and can easily accommodate the amount of metadata of the form that is not the same as before. Big data can be expressed in V forms, such as Volume, Velocity, Variety, Veracity, and Value [27]. Big Data Analytics in the digital era today has a significant role in many sectors. The utilization of big data is very supportive in optimizing the resources available to the company to get competitive advantages and advantages [28]. Big Data also has great diversity and dynamics [29]. The advantages of significant data utilization include descriptive, diagnostic, predictive, and prescriptive analysis [30]. The resulting characteristics of BD require tools and techniques to harvest and analyze both unstructured and structured data that exceed the capabilities of traditional data processing systems. Big Data has characteristics that can analyze unstructured and

structured data that can process quickly and traditional real-time data [31]. Fig. 1 shows the dataset variables to be analyzed and the process using python programming.
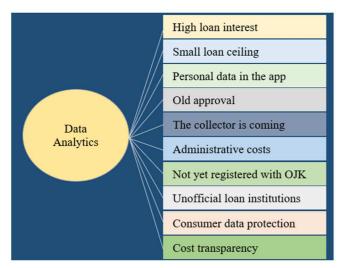

Fig. 1 Risk variables of illegal online loans processed with analytical data with python programming libraries

Ten variables will be carried out in the analysis process, so the following process will create a framework about which words have risks in the problem of illegal online loans.

D. Population and Sample

Websites that become the primary indicator in searching for keywords related to the risk of illegal online loans have high credibility. The dataset used in this paper is sourced from the Internet using predefined keywords. The keywords used are obtained from different websites' Uniform Resource Locator (URL). An example of a website used to define and assign keywords used such as www.cnnindonesia.com. The following will explain the variables used in this study to learn about the risks of illegal online loans.

1) High Loan Interest: Illegal online loans often provide public information about the interest on small loans. The activity of borrowing money for illegal online loans is carried out by individuals and communities in countries with slow growth rates [32]. News from one of the media with a high level of credibility Kompas TV, on June 5, 2021, which watched more than 122,178 impressions, reported that an honoree teacher in one of the districts in central Java became a victim of illegal online loans that provided very high loan interest. This honoree teacher, in the beginning, borrowed money of 3.7 million rupiahs with a safe repayment deadline of 7 days. When the loan money cannot be returned within a predetermined deadline, the loan interest increases and grows until it reaches 200 million rupiahs. The small-interest loan informed illegal online loans is not proven from the case above. Research data also mentions that many cases such as the above, occur in developing countries [33].

2) Small Loan Ceiling: The risk of online loans also exists on a credit ceiling that is not large. Credit regulations are becoming the most common in every country [34]. Loans with small ceilings have an ineffective effect [35]. When filing a money lending process is done by individuals, small ceiling risks often occur. Loans made in the absence of

standardization from the government pose a risk to the borrower to repay and repay the loan prematurely [36].

3) Personal Data in the Application: When starting an online loan, individuals provide access to personal data to the online loan manager. The procedure that is done first is to brew the application on the phone, and then the borrower is required to provide access to personal data. The risk of personal data being open accessed and can be used illegally. The number of apps available on smartphones every day is growing. The data contained in the application is new and has the potential to be used in many ways [37]. Data observation and analysis are the most important part of getting helpful information for many sectors [38].

4) Old Approval: Individuals who do the online loan process expect a fast process when borrowing money. The process that is not fast makes many complaints occur in money borrowers. Online loan applications do not guarantee that the transaction process can happen quickly. The financial ecology included in the monetary system is a diversity that occurs globally [39]. Online and offline loans have different mechanisms in their business activities [40].

5) The collector is coming: If late payment occurs, billing is done in a way that does not follow the rules. Billing to borrowers of money that occurs late in payments is done in various ways, which is detrimental to the community. The use of threats and the spread of individual borrower information to others is expected. Payment planning needs to be made to avoid the risk of uncertainty [41].

6) Administrative Costs: Non-transparent administrative fees exist on many illegal online loans. The additional risk of fees is often experienced by individuals when late payments occur with amounts not following the rules. Administrative costs are a procedure in many activities [42]. The start-up fee cut is hugely done illegal online loans. This activity is detrimental to individual money borrowers who do not understand the transaction process.

7) Not Yet Registered with the Financial Services Authority (OJK): Online loan obligations to register and obtain licenses from official government agencies such as financial services authorities. The policy for regulating and managing online loans is the service authority and financial institution. Online loans that do not comply with the rules of the government are considered illegal or unofficial online loans. Online loans need to get legality from the government [43].

8) Unofficial Loan Institutions: Money borrowers need to be aware of the risk of illegal investments at the beginning of financial *transactions* that are not following the rules and the importance of paying attention to official and unofficial online loans. Increased crime risk can occur in economic activity that is not following government rules [44]. The implementation and process of illegal economies directly impact the population. Risks and impacts are a consequence of illegal economic activity.

9) Consumer Data Protection: Ease in financial transaction activities through online loans makes the risk of customer data easily exposed by other parties. Transparency

of data usage has always been an issue in many illegal online lending activities [45]. User data becomes the most accessible risk to be disseminated without the individual's consent.

10) Cost Transparency: Illegal online loans do not provide transparent information to individuals at the beginning of the money lending process. Cost transparency needs to be known to users of online loan applications. Transaction fees correlate with online loan transparency.

Ten variables will be carried out in the analysis process, so the following process will create a framework about which words have risks in the problem of illegal online loans. After the dataset variable is determined, the following process of the keyword is then entered on the google search engine to find the Uniform Resource Locator (URL) of the website with an indicator of the risk of illegal online loans. From the URL is then done preprocessing data by using the wordcloud generator. The variables that have been set next serve to find website URLs related to the words risk of illegal online loans. Of the many populations of words in the website URL associated with one of the variables, such as high loan interest, will be used as many as 30 datasets.

E. Research Method

The research method used in this study was an experimental method to classify variable words associated with the risk of illegal online loans. There are three stages of research methods: early-stage, analysis, and evaluation. In the first stage, collect data and information available on the Internet using online loan risk variables by taking a Uniform Resource Locator (URL) on one of the credible websites of the google search engine. The popularity of Google's search engine to analyze many things is becoming an essential need of the global community. Ease of access to data analysis activities on Google and available real-time overcome various problems [46].
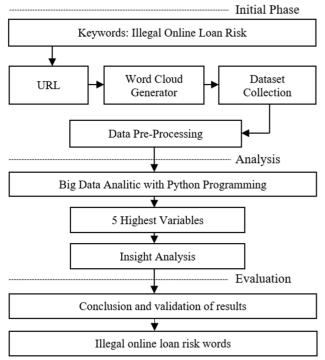

Fig. 2 Research method flowchart

The use of the google search engine requires strategy and setting a goal protocol [47]. The most widely available word on the Internet about online loan risk will be included in tables and frameworks and spelled out gradually. Frameworks are essential to explain the influence of project development. [48].

Words related to the risk of illegal online loans are done with python programming languages using pandas, matplotlib and seaborn libraries. The second stage is to analyze the variables used in this study. This analysis will be made two categories. The five variables with the highest value will be entered into the first group frame. At the same time, the second variable with the lowest value will be included in the second group frame. Frameworks can be used as scenarios and strategies in the future [49].

In the third stage, after getting the words to verify the risks of online loans, the next step is determining which words are less risky and which are precarious on illegal online loans. As a validation process, the dataset and variables used will be created a correlation table to find out the relationship of one variable with another variable. Words with high risk contained in the dataset variables will be used as a reference to the public through this research to provide knowledge about the risks of online loans. This study emphasizes fintech lending or online loans (pinjol) that are illegal or unofficial. This paper took the risk variables of illegal online loans contained on the Internet and big data. Of the many words in search engines on the Internet that will be included, word cloud software will look for words related to the risk of illegal online loans that are popular. The study used data taken from Google with an index on the first page of search keywords. The data used in this study contains data on the Internet with websites in Indonesia in 2020 and 2021. A central concern in the digital economy is how to protect consumer data. Digital technologies and the Internet have enabled firms to collect, transmit, and use consumer data for various purposes, ranging from targeted advertising and price discrimination to the design of tailor-made products, bringing new revenue streams to firms [45].

III. RESULTS AND DISCUSSION

The analysis process is done using pre-established variables. The figure below shows the five variables with the highest number of values. The five variables with the highest values out of the ten variables are separated.
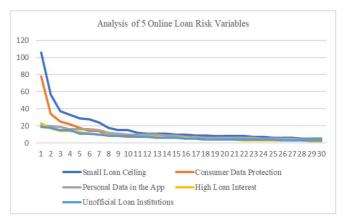

Fig. 3 Analysis of five Online Loan Risk Variables

This image is analyzed from the highest Small Loan Ceiling, Consumer Data Protection, Personal Data in the App, High Loan Interest, and Unofficial Loan Institutions. From this analysis, the small loan ceiling has the most amount compared to other variables, and loans with small ceilings have an ineffective effect [35].

TABLE I
THE HIGHEST COLLECTION OF ONLINE LOAN RISK WORDS

Small Loan Ceiling		Cons. Data Protection		Personal Data in the App		High Loan Interest		Unofficial Loan Institutions	
Weight	Word	Weight	Word	Weight	Word	Weight	Word	Weight	Word
106	loan	78	data	21	illegal	23	loan	20	fund
57	on line	34	consumer	20	victim	17	pinjol	20	illegal
37	business	25	protection	19	pinjol	14	flower	18	pinjol
33	credit	22	company	16	on line	14	tall	12	money
29	loan interest	18	case	16	loan	13	fintech	11	loan
28	million	14	data	16	police	11	on line	10	on line
24	bank	14	Indonesia	15	pinjol	10	bank	8	OJK
18	fintech	8	bill	12	chapter	10	company	7	credit
15	ceiling	8	VIDA	11	case	8	Index	6	borrow
15	tenor	7	crime	10	west	8	percent	6	cash
12	fund	7	public	10	used	7	lending	5	cash
11	application	7	protection	10	java	7	ojk	5	company
11	document	7	cyber	10	million	7	money	5	loan
11	ojk	6	government	9	data	6	fund	5	rupiah
10	finance	6	theft	9	Jakarta	6	credit	4	business
10	process	6	need	7	application	6	money	4	fintech
9	instalment	6	as much	7	public	5	million	4	investment
9	financing	6	year	6	bareskrim	4	big	4	capital
8	limit	5	application	6	finance	4	English	4	pinjol
8	p2p	5	so	6	authority	4	tenor	3	flower
8	borrower	5	used	6	thug	4	registered	3	Need
8	company	5	until	6	personal	3	cost	3	Search
7	collateral	5	law	6	registered	3	flowers	3	Deposit
7	guarantee	5	party	5	police	3	illegal	3	Purse
6	Approved	5	about	5	car	3	investment	3	Money
6	borrow	4	for	5	party	3	case	3	Finance
6	cash	4	digital	5	suspect	3	criticize	3	Industry
5	so that	4	fintech	4	bulging	3	risk	3	Insight
5	liquid	4	lending	4	illegal	2	digital	3	media
5	payment	4	regulation	4	Indonesia	2	report	3	unsettling

TABLE II
VARIABLE CORRELATION WITH PYTHON PROGRAMMING

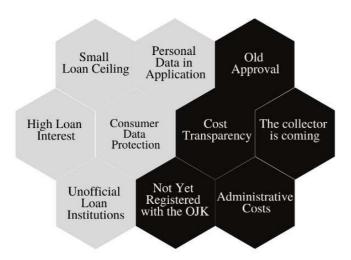|	Correlation of ten risk variables of illegal online loans									
Variable	High Loan Interest	Small Loan Ceiling	PersonalData in The App	Old Approval	The coll is coming	Adm.Costs	Not Yet, Reg. OJK	Unofficial Loan Institutions	Cons.Data Protect	Cost Transparency
High Loan Interest	1.00	0.92	0.96	0.94	0.97	0.93	0.94	0.98	0.88	0.97
Small Loan Ceiling	0.92	1.00	0.83	0.95	0.92	0.98	0.90	0.89	**0.99**	0.90
Personal Data in The App	0.96	0.83	1.00	0.88	0.94	0.85	0.93	0.97	0.77	0.96
Old Approval	0.94	0.95	0.88	1.00	0.97	0.95	0.96	0.94	0.94	0.93
The collector is Coming	0.97	0.92	0.94	0.97	1.00	0.92	0.97	0.97	0.88	0.97
Administrative Costs	0.93	0.98	0.85	0.95	0.92	1.00	0.92	0.90	0.96	0.91
Not Yet Registered with the OJK	0.94	0.90	0.93	0.96	0.97	0.92	1.00	0.97	0.86	0.95
Unofficial Loan Institutions	0.98	0.89	0.97	0.94	0.97	0.90	0.97	1.00	0.83	0.98
Consumer Data Protection	0.88	**0.99**	0.77	0.94	0.88	0.96	0.86	0.83	1.00	0.85
Cost Transparency	0.97	0.90	0.96	0.93	0.97	0.91	0.95	0.98	0.85	1.00

Fig. 4 Online loan risk model of two words.

The model further creates the variable data used in this paper, as in the picture above. The first group is the group with the highest number of gray, and the second group with black shows the group model with the lowest number of analysts that have been done. All the variables in this study were then analyzed using the python programming language. Analyzing datasets with python programming languages provides ease in determining the variables to be observed. The analysis results are done with python programming language using pandas, matplotlib, and seaborn libraries, leading to variables "small loan ceiling." It significantly influences variables "consumer data protection" with a value of 0,99. The correlation between the two variables "small loan ceiling" and "consumer data protection" has a powerful influence. These two variables are included in the five with the highest value in table I, The highest collection of online loan risk words. In the variable population dataset, illegal online loan risk also shows these two variables have the number of searches on the google search engine with a vast number consisting of the word small loan ceiling as many as 7,240,000 search results on google the word consumer data protection 8,070,000 search results. A theoretical foundation in this research also contains theoretical studies from previous research, such as variables. "*Small Loan Ceiling"* explained in the research by A. Cozarenco and A. Szafarz, "The regulation of prosocial lending : Are loan ceilings effective ?," J. Bank. In finance, loans with small ceilings have an ineffective effect [35]. Next is also on the research. P. N. Dixon, C. A. Fox, and E. K. Kelley, "To own or not to own : Stock loans around dividend," *J. financ. econ* bring up when filing a money lending process is done by individuals, small ceiling risks are very often occurring.

Loans made with a lack of standardization provide a risk to borrowers of repaying loans prematurely [36]. On variables "*Consumer Data Protection,"* It also contains theories of previous researchers such as Y. Chen, X. Hua, and K. E. Maskus, "International protection of consumer data" J. Int. Econ, surprisingly, ease in financial transaction activities through online loans makes the risk of customer data easily exposed by other parties. Transparency of data usage has always been an issue in many illegal online lending activities [45]. The results of this study also provide information about the words widely found on the Internet about online loans that strongly influence the information on the first page of search engines. Information becomes the reader's priority on this first page, and the information is found. The analysis made in this study is very useful for the public in avoiding online loans, especially illegal ones, by knowing the variables of the words contained in the risk of illegal online loans. The ten variables used in this study are high loan interest, small loan ceiling, personal data in the App, old approval, the collector is coming, administrative costs, not yet registered with the OJK, unofficial loan institutions, consumer data protection, cost transparency.

IV. Conclusion

This *study* analyzed ten risk variables of illegal online loans with an analytical data approach using several libraries in python programming. The primary purpose of this paper is to find variables that have a high risk of illegal online loans. The earlier analysis data can guide many parties in choosing and assessing the risks of illegal online loans by observing these variables that we make. The dataset used in this paper is limited to searches with Uniform Resource Locator (URL) only. It is necessary to identify variables comprehensively against other variables contained in big data to be able to produce different perspectives in subsequent studies. A large amount of data and information regarding the ease of the illegal online loan process is detrimental to the public. Extensive information in various media regarding online loans makes it easier for people to use illegal online loan applications. People need to avoid various applications that provide convenience in borrowing money because if they are not careful, they will be detrimental in the future. Our contribution to this study was to analyze the risk variables of illegal online loans. We found that consumer data protection correlates with the small loan ceiling. Data and information on the Internet with various digital platforms can be an initial clue to avoiding illegal online loans.

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