U-TAPIS Sal-Tik : Typing Error Detection Using Random Forest Algorithm

Bryan Glennardy¹, Marlinda Vasty Overbeek², Niknik Mediyawati³, Samiaji Bintang Nusantara⁴, Rudi Sutomo⁵

^{1,2} Informatics Study Program, Universitas Multimedia Nusantara, Tangerang, Indonesia ¹bryan.glennardi@student.umn.ac.id, ²marlinda.vasty@umn.ac.id

^{3,4} Digital Journalism Study Program, Universitas Multimedia Nusantara, Tangerang, Indonesia ³niknik@umn.ac.id, ⁴samiaji.bintang@umn.ac.id

⁵ Information System Study Program, Universitas Multimedia Nusantara, Tangerang, Indonesia ⁵rudi.sutomo@umn.ac.id

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Abstract—The result of this study indicate that the development of technology in the field of journalism has grown very rapidly. However, there are still frequent deviations in language usage on online news portal, particularly in terms of spelling and word usage. Spelling mistake in news articles can cause the information to be unclear and ambiguous. Based on these issues, a study was conducted to create a model to detects typos in Bahasa Indonesia. This model was conducted to create model to detect typos in Bahasa Indonesia. This model was created using the Random Forest algorithm. The Random Forest algorithm works by constructing several decision decisions tree and then combining the decisions from each tree, taking the majority vote from the predictions of each tree to produce stable and accurate prediction. The result of this study show that the model achieved an accuracy of 100%. However, it should be noted that this 100% result means that the model is able to detect words that are already present in the dataset. Based on the evaluation results, since the detected words were contained in the dataset, the accuracy reported is 100%. The model successfully detects typos in Tribunnews news articles.

Index Terms—detection; news articles; random forest algorithm; type error

I. INTRODUCTION

Nowadays, technology has developed very rapidly. Technology comes with the aim to help make it easier for humans to do their daily work. One field that has experience significant technological development is journalism. In the past, news media primarily relied on the print media to disseminate news, requiring people to read newspapers or other printed publications. However, with advancements in technology, news can now be spread online, including through websites. This allows people to access news easily and freely, anytime and anywhere. News itself a report about a recent event or the latest information regarding an event. In other words, news consists of interesting facts or important information conveyed to the public through various media channels [1]. In journalism, language is used to convey precise and accurate information to the public through mass media [2]. One of the functions of language is as a tool for communication so that the use of language, especially Indonesian, must use good and correct spelling based on existing rules. Spelling itself is a procedure for using words, sentences, and punctuation both in oral and written form [3].

Technological developments in the field of journalism have developed very rapidly, but there are still frequent deviations from the language on online news portals. Usually, this can be seen from the aspect of using spelling and words that are not in accordance with the established writing rules and this is not uncommon in online news portals [4]. This can occur due to the speed of the news dissemination itself, which usually causes errors when typing the news and also when it is in the editing process. Spelling errors that occur in the news can cause the information contained in the news to be unclear and ambiguous [5]. In research that has been conducted related to the analysis of language errors on online news portals with a case study of the Suara.com online news portal and research related to word writing and punctuation errors in online news, it is concluded that there are still many typing errors in the news [6] [7].

Based on the existing problems, research was conducted to detect type error on online news portals which in this study will use news from the Tribunnews news portal namely U-Tapis Sal-Tik. This is because there are requests from partners regarding the creation of several modules and one of them is a module for detecting type error. There is a reason why Tribunnews wants to make this module, namely because Tribunnews uploads 3000 to 5000 articles a day and each reporter is required to write 20 articles. With such a large amount of production, the possibility of errors in publishing is great. Language errors in news can reduce the credibility and public trust in the information presented by the media. Tribunnews itself is the number one online news portal in Indonesia managed by PT Tribun Digital Online. Tribunnews.com has a network that has spread throughout Indonesia called Tribun Network [8].

U-tapis already conducted before in 2020 until 2023 [9-13]. The research that has been done is the detection of misspelled words using the Jaccard similarity algorithm where this research found an accuracy rate of 93.2% [14]. Then there is also research on detecting the use of conjunctions using the cosine similarity algorithm where this research found an accuracy rate of 92.2% [15].

This type error detection research will use the random forest algorithm. The reason why this research uses the random forest algorithm is because random forest is one of the algorithms in ensemble learning that is used to classify large data sets. In addition, there are several advantages of this algorithm, such as having good accuracy results, relatively strong against outliers and noise, simple and easy to parallelize [16]. In several studies that have been conducted related to text classification also show that the random forest algorithm has a fairly high accuracy rate such as sentiment analysis of the Ruangguru application which has an accuracy rate of 97.16% [17] and fake news detection which has an accuracy rate of 84% [18].

The detection model created can detect by learning from new data that has been trained so that the model can increase its knowledge so that it does not detect by matching words or string matching. In addition, the model does not only detect type error, but it can also provide suggestions for word correction from type error that have been previously detected by the model.

By doing this research, it is hoped that it can detect type error properly and correctly so that it can help news writers in checking type error in the news articles written. Then also with the success of this research, it is hoped that the information contained in the news articles written can be conveyed properly to readers.

II. METHODS

A. Type Error

Type error is an error that occurs during the process of typing text and can change the meaning of a word and even the meaning of a sentence [18]. The occurrence of type error can cause information not to be conveyed properly to the reader and can also cause misunderstanding of the information provided to the reader.

B. Online News Portal

Online News Portal is a site or web page that contains various types of news, such as politics, economics, social, culture to entertainment that is hard news and soft news [19].

C. Text Preprocessing

Text Preprocessing is a process that aims to select text data so that it will be more structured [20]. In text preprocessing, there are several steps that need to be done, including the following.

- Case Folding, is a process that aims to convert all characters into lowercase letters and also eliminate characters that do not include letters [21].
- Tokenizing, is a process for breaking sentences into words [22].
- Filtering, is an advanced stage of tokenizing where this stage is used to select important words from the tokenizing results that have been done previously by removing words that cannot be used or can also be called stopwords [23].
- Stemming, the process of changing a word into its base form [23].

D. Decision Tree

Decision tree is a method for classification using a representation of a tree structure where each node represents the attribute, then the branches represent the value of the attribute and the leaves represent the class [24].

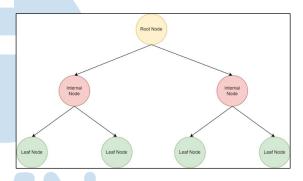


Fig. 1. Decision tree diagram [30]

Fig 1 is a diagram of a decision tree. As can be seen in Figure 1, the nodes in the decision tree are divided into three types, including the following [24].

- Root Node is the node located at the very top where this node has no input and allows it to have no output but it is also possible to have more than one output.
- Internal Node is a branching node. This node has one input and has an output. In the internal node, entropy calculation is performed. Entropy serves to measure the level of uncertainty or impurity of the attribute [25]. After determining the entropy, the calculation of the gain of each attribute is carried out. Gain is a value used to select attributes to generate new nodes. The following is the formula for calculating entropy and gain [25].

 $Entropy(S) = \sum_{i=1}^{n} - pi * \log_2 * pi \qquad (1)$

Where S is a set of cases, n is a number of S partitions and Pi is a proportion Si to S. And gain formula is

 $Gain(S,A) = Entropy(S) - \sum_{i=1}^{n} \frac{|Si|}{|S|} * Entropy(Si)$ (2)

• Leaf Node or also known as Terminal Node is the final node where this node only has one input and has an output in the form of a decision or final prediction

E. Ensemble Learning

Ensemble Learning is one of the machine learning paradigms where multiple models (base-models) are trained and combined to get better results[26]. In ensemble learning there are three models, including the following[26].

- Bagging is one method of ensemble learning which uses one type of base model by training in parallel and independently on each base model, then combining them to get the best results. Random Forest algorithm is one of the algorithms included in the bagging model.
- Boosting is one of the methods of ensemble learning which uses one type of base model where training is done sequentially and the results of each base model depend on the results of the previous base model. Adaptative boosting algorithm (AdaBoost) is one of the algorithms included in the boosting model.
- Stacking is one of the methods of ensemble learning in which training uses several base models which are then carried out in parallel and independently on each base model and then uses an algorithm derived from other learning to produce output from the combination of each base model. Blending algorithm is one of the algorithms included in the stacking model

F. Random Forest

Random forest a data mining algorithm method used to classify a dataset [27]. The way this random forest algorithm works is to build several decision trees then combine the decisions of each tree that has been built and take the most votes from the predictions of each tree so that later it will produce stable and accurate predictions [28].

G. Confusion Matrix

Confusion matrix is a table used to measure the performance of machine learning. In the confusion matrix table, there are four variables, including True Positive (TP) is data that is positive and predicted to be true positive by the system, False Positive (FP) is data that is negative but predicted to be positive by the system, False Negative (FN) is data that is positive but predicted to be negative by the system, and True Negative (TN) is data that is negative and predicted to be true negative by the system [29]. Table 1 is a form of confusion matrix table.

ABLE I.	CONFUSIONAL
ABLE I.	CONFUSION MATRIX

Actual Value	Predicted Value		
	1	0	
1	TP	FN	
0	FP	TN	

TÆ

Confusion matrix is used to calculate accuracy, precision, recall and F1 score. The following is the method used in the confusion matrix to calculate these four things [30].

• Accuracy is a description of how accurate the system that has been created in performing the classification correctly. The following is the formula for how to find the accuracy value.

$$Accuracy = \frac{TP+TN}{TP+FP+FN+TN}$$
(3)

• Precision is a description of the accuracy of the requested data with the prediction results given by the system. The following is the formula for how to find the precision value.

$$Precision = \frac{TP}{TP+FP}$$
(4)

• Recall is the level of success of a system in finding back information. The following is a formula for how to find the recall value.

$$Recall = \frac{TP}{TP + FN} \tag{5}$$

F1 Score is the average value of precision and recall. Here is the formula for how to find the F1 Score value.

$$F1 = \frac{2*Recall*Precision}{Recall+Precisio}$$
(6)

III. RESULT AND DISCUSSIONS

A. Interface Display

The following is the interface of the type error detection model. Figure 2 is the home page of the website.

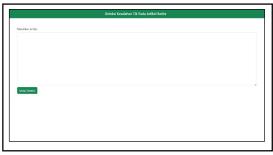


Fig. 2. Home Page Display

Fig 2 is the home page of the website. This page serves as a place for users to enter news articles to be

detected. Users can enter the news article they want to detect through the text area on the home page and then press the '*Mulai Deteksi*' button to start the detection process.



Fig. 3. Results Page Display

vah kita ingin atur Hanya kebetulan objeknya <mark>seksulitas</mark> ini yang sering menjadi perdebatan i. poin-poin krusial itu meliputi judul undang-undang, sistematika, perlindungan kepada p atau terbatas. Di dipilih tertutup untuk melindungi korban. Dan yang paling utama adalah

Fig. 4. Display of Detected and Highlighted Type Error Words on the Result Page

1. Kata SEKSULITAS adalah typo.
Saran koreksi kata yang benar dari kata SEKSULITAS adalah seksualitas, sensualitas, sekularitas, sekuritas.
2. Kata KEMULIANNYA adalah typo.
Saran koreksi kata yang benar dari kata KEMULIANNYA adalah kemuliaannya, kehamilannya.

Fig. 5. Display a List of Type Error Words along with Suggestions for Correct Word Correction on the Result Page

Fig 3 is an outline of the results page when the entered news article has been detected. Then in Fig 4 is a display on the results page where the detected type error words will be marked and also in Fig 5 is a display of the list of detected type error words along with suggestions for correct word correction. list of detected mistyped words along with suggestions for correct word corrections.

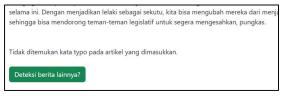


Fig. 6. Display of the Result Page with the Wrong Type Error Word Not Found

Fig 6 is the result page but with different conditions. In Figure 12 no mistyped words are detected so no words are marked and the list of mistyped words is displayed.

B. Testing

At this stage, testing is carried out on the type error detection model that has been created. There are two types of tests carried out, including testing based on the number of news and testing based on the cutoff value.

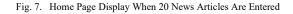
Testing Based on Number of News

In the first type of test, testing was carried out on the model that had been made with a total of 50 news articles that were entered with different amounts or gradually, namely 20 news to 40 news and to 50 news. Testing by entering the number of news articles in stages aims to see the model's ability to detect tick errors as the number of news increases whether there is a decrease in performance or not as the number of news increases and whether the model can handle larger amounts of data well.

Testing with 20 News

Testing based on the number of news starts with 20 news. Fig 7 is a display of the home page that entered 20 news to be tested.

Assukkan	Arthol
xetiga k	ata, disieformasi pada tanggal 20 November 2021 yang menyatakan bahwa anggota parlemen meninggal dunia kasena vaksin.
Кеепр	it, disinformasi pada tanggal 22 November 2021 mengenai klaim digunakan untuk melacak manusia di seluruh dunia," ucapnya.
Lalu; hoi	sis pada tanggal 24 November 2021 mengenai mandi dengan ramuan soda kue, garam dan tanah liat bertonit dapat menghilangkan kandungan vaksin.
mengala	kan, demiklanlah sejumlah hoaks yang masih terua menyebar dan menjadi salah satu kendala penanganan di.
	terus kita lowan, presebaran harus kita sangkat, bersama sama kita jaga generasi muda untuk masa depan yang lebih bak terindungi dari dan tumbuh menjadi generasi yang cerdas dalam dapi hoaks dan tantangan danis ke depan," jelasnya.
Mutal Dr	Yeku



In the 20 news articles entered, there are 3809 words which is the total word result after passing text preprocessing with 29 type error. After detection, 26 type error were detected. Fig 8 is a display of the total type error detected on the results page of the test with 20 news articles.

1	24. Kata YANV adalah typo.
100	Saran koreksi kata yang benar dari kata YANV adalah yang.
ŝ	25. Kata HEIKOPTER adalah typo.
	Saran koreksi kata yang benar dari kata HEIKOPTER adalah helikopter.
100	26. Kata BERNAI adalah typo.
100	Saran koreksi kata yang benar dari kata BERNAI adalah berunai, berinai, berona, bernga, berapi, berani, berair, berahi.

Fig. 8. Display of Test Results With 40 News Articles

Testing with 40 News

The next test was conducted with 40 news articles. Fig 9 is a display of the home page that includes 40 news articles to be tested.



Fig. 9. Home Page Display When 40 News Articles Are Entered

In the 40 news articles entered, there are 6821 words which is the total word result after passing text preprocessing with 61 type error. After detection, there are 48 detected type error. Fig 10 is a display of the total type error detected on the results page of the test with 40 news articles.

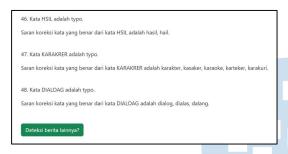


Fig. 10. Display of Test Results With 40 News Articles

Testing with 50 News

The next test was conducted with 50 news articles. Fig 11 is a display of the home page that includes 50 news articles to be tested.

mengalami kesulitan dalam proses produksi film tersebut, para pemain bisa terbuka dalam diskusi akting dengannya.	
tidak ada kendala yang berarti. Untuk membangun pernain, tidak ada cara khusus, karena terbuka untuk disikusi, pada saat," ujarnya.	
tersebut dikintangi oleh.	
ahlan tentang, editor di peneristan kecil, harus mengubur perasaan cintanya pada, kakak angkarnya yang seorang penulis novel terkenai karena, bosnya menyukai, Persai I kantor mewamai hari hari, hingga menguak masa lalunya yang kelam.	
adir, pada November 2021 nanti.	

Fig. 11. Home Page Display When 50 News Articles Are Entered

In the 50 news articles entered, there are 8535 words which is the total result of words after passing text preprocessing with 79 mistyped words. After detection, there are 60 detected type error. Fig 12 is a display of the total type error detected on the results page of the test with 50 news articles.

From the test results based on the number of news stories that have been carried out, it can be concluded that the model has successfully performed type error detection. However, there are still some type error words that are not detected. Fig 13 is a comparison graph of testing based on the number of news.



Fig. 12. Display of Test Results With 50 News Articles

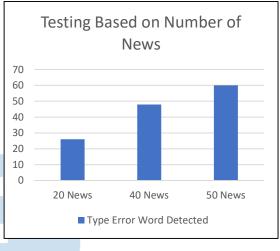


Fig. 13. Comparison Chart of The Test Based on The Number of News

Testing Based on Cutoff Value

In the second type of test, tests were conducted using different cutoff values. This aims to see the word correction generated from mistyped words with different cutoff values.

Testing with Cutoff Value 0.85

The test was conducted by giving a cutoff value of 0.85. Fig 14 is the display when a news article is entered to test with a cutoff of 0.85.

Mastake Adher Erken dreg bit sens statut menticipatiske fol kondet. Tolebit koli ancesarja tejes mejad kanag kanag meding dan. * Is mejadaka kang basag jet liket digegapata je kanama ki kelik da ga mat. ************************************	Deteksi Kesalahan Tik Pada Artikel Berita	
Entrancellar dang tala sana atala menticatakan ké mendua Tangké kasé mencasanga tagi mengén dawang kenang mendang den La menyelikakan kanang kenang met den danggakan pa kenema ké nélit sang maké. Metaga Dalas angel kasé kasé mengen engel tala sandapa kejang ada sakang dalam pikan lana adadi, mengakan kan Rij semanya akan berpalong lapada angeg lacan (maja) Menga balan pengla kenemaki katika bana ban ka haki sakat angenda yang denik angeg dala migrag balan japa. Tenga balan menja ka adak (*		
is negativalise laway laway yeng tehi dilagakan jak amara kin nilis ang mak. Na taga kaway laway met is, is takin ata mengan peper ka uning kaba kang dala takang dalam pikan kan akala, mengakan hai mili, semanya atan berpalang panak pengan kang dala menilis atili seti banka hai hait seti angent yang diniti uning pakam jaga. Tanggat kang dala menilisi kati banka hait kati banka taki angentyang diniti uning pakam jaga.	Manakkan Artikel	
Na leap be an appert. But stards, data mengan spert But sentya hang bita ga ada pang ada sepang data pakan pakan bakan kempulan hak mBu semunya akan berpalang bipaka. Menga belan appela ha melihi mBit mak beak betah bak, betat sent appela pengang dinis indega pelahan yapa. Menga belan menjadi ke adata: Mengada belan deman semungiad ke adata:	Rahkan dirinya tak sama sekali membicarakan hal tersebut. Terlebih soal rencananya ingin menjual barang-barang mendiang dan	
selagai kuti yangka Minga kuti yangka memilik walik tak basi bata hali. Inaka selada yang dinisi sebarap padam japa Tangka balan mejata kuti kuti kuti kuti kuti kuti kuti kuti	la menyebutkan barang-barang yang telah ditinggalkan ya itu semua kini milik sang anak.	
"Sengel bilan mayak ba sela". Na tapaté akaban disebun meningal deli nu dék ada kenaringan Da kaba wang digel hu" kaba		ł.
Nu (papada) adarkum minimaal ada ku, dulu ada kapemirnaan. Ka kotuh uweg disasi ku " tutua	Hingga kini juga tak memiliki sedikit niat buruk terkait hal itu. Terkait soal sepeda yang dinilai seharga puluhan juga.	
	"Sampai bolum menjual. Au salah."	
Male Sealer	Na (aspeda) sebelum almathum meninggal ada itu, dulu ada kopenlingan. Dia lootuh uwep dijual itu," tutup	
	M/ar DetAsi	

Fig. 14. Home Page View When Tested With a Cutoff Value of 0.85

After testing, in the tested news there is one type error word, namely '*kpeada*' which should be '*kepada*'. However, the result issued is that the word suggestion is not found. Fig 15 is a list of detected mistyped words on the results page with testing using a cutoff value of 0.85.



Fig. 15. Display Page Test Results With a Cutoff Value of 0.85

Testing with Cutoff Value 0.75

Further testing is done by giving a cutoff value of 0.75. The news used is the same as the news used in Fig 15. After testing using a cutoff value of 0.75, the results of word correction suggestions from the type error word '*kpeada*' were successfully obtained. Fig 16 is a list of type error words detected on the results page by testing using a cutoff value of 0.75.

	Deteksi Kesalahan Tik Pada Artikel Benita
	Hasil Deteksi Kesalahan Tik
menjual basang ba membicarakan hal bicasa seperti itu, it ungkap Hingga ki	ւ ներց կուց Mit Mindag dis Laure Network has has it remained on Signa gati meding, ang juli pang hang meding die Saki Arite, sentante Ariti, mang penenggian akang dar mananya. It i Min saki kang bang melang peng digi "Laura di man Saki Sharita", Balan dang dar ang saki ng saki saki saki saki saki saki saki saki
1. Kata KPE/4DA ad	alah iyoo.
Saran koreksi kata	yang benar dari kata KMLADA adalah kepada.
Orteksi benta lai	1 Seguro

Fig. 16. Display Page Test Results With a Cutoff Value of 0.75

Testing with Cutoff Value 0.65

Furthermore, testing is done by giving a cutoff value of 0.65. Fig17 is the display when the news article is entered for testing with a cutoff value of 0.65. testing with a cutoff value of 0.65.

	Alan Artisel
	au in diaritan degan franzaka maia menaham Penasik hana mang tarena ika sidak bisa mengjadian kesifar sosial bagi sekark najari intonesia apabia belum kisa mengjadian menutan yang adi da benada paper Pendili Institu, dalam intemprina yang ama.
seksual	ngengelan, perenyuan talak bisa belenja sendiri untuk menghembian kelensan seksuat. Apatog laki, kendasakan data yang ada, men-patan pelatu sebanyak deri terdak kelensan seksuat ana IN
bisa	ngan menjadikan lelaki sebagi selutu, kita bia mengkalah meraka dei merjadi mata dipertukan hadenya lak-baki dalam proser lahirnya ini. Dan saya berharap media bia bantu sehingga bia ndorong teman teman lapidat untuk wapera mengkadukan, pungken.
	tia Detecia
	nna tá: ngan meglatika haku katagai kebut, bia bia mengdah menda dal meglat maia dijentak hadinga bid-aki dalam proset kelinga kebut apat kehang meda bia kantu anlangga bia adamang memura langkad mahangan mengkadikan, pangkan.

Fig. 17. Home Page View When Tested With a Cutoff Value of 0.65

After testing, the tested news contained four mistyped words, namely 'seksulitas', 'kemuliannya', 'menberi', and 'kemanusian' which should be 'seksualitas', 'kemuliaannya', 'memberi', and 'kemanusiaan'. These four misspelled words have successfully obtained word correction suggestions. Fig 18 is a list of mistyped words detected on the results page by testing using a cutoff value of 0.65.

Then testing using the same news with a cutoff value of 0.75 can be used as a comparison of the

resulting word correction. Fig 19 is a list of mistyped words detected on the results page by testing using a cutoff value of 0.75.

- 5	nadman, saga-maha naso xonan kortan atau kasas hasas Azen san sensuat Anta harus ino oppini tewa product tukum. Angan sampar baryaknya kasas keterasan seksuat menjadi walah penadao ndonesia, ujar, Persoalan ini, jadi bagaimana lita memperjaangkan loadian. Ini kepentingan sosial ita karena tekerata seksuat sudah menjadi persoalan publik, intulinya. Persoalan beerasan seks
	san dianggap berkaitan dengan Pancasila. Mengingat seksuaitas masak dalam ranah privat, negara disebat harus hadir melalui bertuk regalasi. Kalau ini dikaitian dengan Pancasila, maka menahani
	fançasila harus runat karena kisa tidak bisa mewujudkan keadilan sosial bagi seluruh rakyat Indonesia apalnia belum bisa mewujudkan keemarusian jung adil dan beradab, papar Peneliri Institut, dala
	esempatan yang sama, mengingatkan, perempuan tidak bisa bekerja sendiri untuk menghertikan kekerasan seksual. Apalagi laki-laki, berdasarkan data yang ada, merupakan pelaku terbanyak dari
	indak kekecacan seksual selama ini. Dengan menjadikan lelaki sebagai sekatu, kita bisa mengabah mereka dari menjadi maka diperlukan hadirnya laki-laki dalam proses lahirnya ini. Dan saya berhara
9	reda bisa bartu sehingga liisa mendolong teman teman legislatif umuk segera mengesahkan, pungkas.
j	. Kata SEKSULTIAS adalah tupo.
ì	iaran koreksi kata yang benar dari kata SUSSUUTAS adalah seisualitan, semualitan, sekuritan, sekuritan, sekuritan, sekuritan, sekuritan,
4	Kata KEMULANNYA adalah tipo.
1	aran koreksi kata yang benar dari kata KDM, DAPAPAA adalah kemuliaanya, kebamilannya, kegiatannya,
3	. Kata MENBEN adalah typo.
	aran koreksi kata yang benar dari kata MENIGEN adalah menyeri, menteri, mengeri, mengeri
	Keta VEMANUSUM adaleh hon.
	iaran konkisi kata yang benar dari kata KEMMUDSAN adalah kemanupiaan, kemanisan, kesangsian, kemanisiran, kemanduran, kemanduran, kehangupan,
	Deteksi berka lainnya?

Fig. 18. Display Page Test Results With a Cutoff Value of 0.65

More place to the lenses of personness of the lenses of personness of the lenses of th
1. Kess SPECIFIES selent type
Saran koreksi kata yang benar dari kata SEKSUUTAS adalah selesualtas, sensualtas, sekurintas, sekurintas,
2. Kata KEMULUANIWA adalah typo.
Saran koreksi kata yang benar dari kata KEMULUMNNA adalah kerwalaannya, kebamilannya.
3. Kata MENBERI adalah type
Saran kovelsi kata yang banar dari kata MENBEN adalah menyeri, mengeri, mengeri, menyerit, menyerit, mengerit, mengerit

Fig. 19. Display Page The Second News Article Test Result With a Cutoff Value of $0.75\,$

From the results of the tests conducted, the word correction suggestions from the type error words '*seksualitas*', ' *kemuliaannya*' displayed with a cutoff value of 0.75 resulted in a smaller number of correction suggestions than using a cutoff value of 0.65. This shows that the smaller the cutoff value, the more and further the similarity level of the word correction suggestions generated from the detected type error words

C. Evaluation

After conducting the testing stage, the next step is evaluation. In this evaluation stage, calculations are carried out using the confusion matrix. This aims to determine the accuracy, precision, recall, and F1 score of the model. In making the evaluation, the training data is 80% and the test data is 20% of the training data and the accuracy, precision, recall, and F1 score results are 100%. Fig 20 is a classification report from the results of the calculations that have been done.

p	recision	recall	f1-score
correct	1.00	1.00	1.00
incorrect	1.00	1.00	1.00
accuracy			1.00
macro avg	1.00	1.00	1.00
weighted avg	1.00	1.00	1.00

Fig. 20. Classification Report Display of Calculations Performed

IV. CONCLUSION

Based on the research that has been done, it can be concluded that the typing error detection model using the random forest algorithm has been successfully built. From the results of the confusion matrix calculation carried out using 80% of the dataset as training data and 20% of the training data as test data at the evaluation stage, the results of accuracy, precision, recall, and F1 score are 100%. This shows that the model built has been able to detect type error, especially in the 50 Tribunnews news articles entered when testing. But keep in mind that this 100% result is that the model is able to detect words that are already contained in the dataset. Based on the evaluation results that have been carried out, because the detected word is contained in the dataset, the accuracy issued is 100%. However, if it is not contained in the dataset, such as one of the letters is mixed up or deleted, it will allow the word to be recognized by the model which is done by majority vote and will provide correction of the correct word from the word by looking at the level of similarity performed by the get close matches function from the difflib library. The reason for using 20% of the training data as data test data is because when calculating the evaluation, the model becomes very dependent on the dataset so that if in the evaluation calculation there is a word that is not in the dataset, the model will not be able to evaluate it. that is not in the dataset, it will cause the model to be unable to perform the evaluation calculation. perform evaluation calculations.

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