

## The Importance of Neutral Content in Sentiment Analysis with Artificial Intelligence Model

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In the context of international economic integration and globalization, new challenges and requirements emerge, necessitating a fundamental transformation of existing conditions within production organizations. It becomes crucial to effectively utilize production resources, automate business processes, and achieve a high level of integration with customers and business partners to create new values. Traditionally, customer feedback is collected through questionnaires, and sentiment analysis, primarily classifying sentiments as positive or negative, becomes pivotal. However, companies often overlook the importance of neutral opinions. This paper presents the outcomes of our research in this domain, showcasing an information system designed using Microsoft Power Platform and Azure SQL. Company employees engaged in surveys through a mobile application, evaluating the performance of a service integrated into the information system. The collected data underwent processing using an artificial intelligence model (Sentiment Analysis). The study revealed that the AI model accurately assessed positive and negative content. However, when users provided responses that specifically detailed the performance of the embedded service, the AI model tended to assign a neutral rating. In tasks requiring specific observations in survey responses, neutral evaluations carry a certain weight. Consequently, the Power BI dashboard, incorporated into our system for managerial use, displays the number of positive and negative evaluations alongside neutral content. This allows managers to easily review neutral feedback and make informed decisions. © 2024 Bull. Georg. Natl. Acad. Sci.

automatic content recognition, artificial intelligence, Azure SQL, AI Builder

In the context of international economic integration and globalization, new challenges and requirements emerge, necessitating a fundamental transformation of existing production organizations. The effective utilization of production resources, the automation of business processes, and the high-level integration of customers and business partners in creating new value are of paramount importance.

Traditional feedback collection from customers typically involves the use of questionnaires.

The task of sentiment analysis involves classifying emotions as either positive or negative, and often, companies are less concerned with neutral opinions. This paper presents the results of research conducted in this area.

The concept of digitization should be examined from various perspectives. Digitization primarily

entails the transfer of real-world data into computer systems, their storage, and their conversion into different formats. It encompasses the planning of all business processes, the processing of extensive databases through computer technologies, and the utilization of intelligent analysis systems [1] for swift information processing.

The significance of a customer to a company extends beyond monetary impact; it is also influenced by the level of their contentment. Contented customers actively share positive experiences, whereas dissatisfied ones may communicate negative feedback. This collective voice significantly contributes to shaping the company's reputation, a pivotal factor in consumer decisions regarding products, services, or companies.

Sentiment analysis has proven to be a valuable tool to gauge public opinion in different disciplines. It has been successfully employed in financial market prediction [2], health issues, customer analytics, commercial valuation assessment, brand marketing, politics, crime prediction, and emergency management [3]. To assess customer satisfaction, businesses must obtain valuable feedback directly from consumers. Conventionally, one common method for collecting such feedback is through the use of questionnaires. These user point-of-views are used by manufacturers, companies, small and large business owners and organizations to assess customer feedback and review, evaluate the market response and study user complaints, preferences, liking, favors to provide improved product and better customer assistance and support and directly increase its business profits [4]. Sentiment analysis is the process of gathering and analyzing people's opinions, thoughts, and impressions regarding various topics, products, subjects, and services. People's opinions can be beneficial to corporations, governments, and individuals for collecting information and making decisions based on opinion [5].

The task of sentiment analysis in its basis is the task of classifying expressed feelings, usually to

positive or negative ones. Neutral opinions are expressed less frequently than positive/negative ones and have significantly less or no influence on the other customers' opinions. Therefore, companies are often not interested in them [6].

Current studies mostly concentrate on multi-label sentiment classification, while filtering out neutral opinions/sentiments. Due to the unavailability of proper knowledge of handling neutral opinion, the exclusion of neutral sentiment might lead to disruption in optimal decision-making or valuable information loss.

## System Design

Currently, we are witnessing a digital transformation sweeping through the business world. To maintain competitiveness, businesses must identify and employ new technologies that result in changes to their operational processes [7]. The Microsoft Power Platform is a technology that provides solutions to these challenges and plays a critical role in propelling digital transformation [8]. AI Builder empowers businesses to leverage artificial intelligence models for process automation. Furthermore, the integration with Power Apps and Power Automate simplifies the utilization of AI.

Our objective was to create a system that simplifies the analysis of survey text for an organization's manager using artificial intelligence. Simultaneously, we aimed to conduct research to assess the effectiveness of an AI sentiment recognition model tailored to a specific survey.

This work introduces an information system developed using Power Apps, Power Automate, AI Builder, and Azure SQL. With a mobile application designed using Power Apps, employees of the company record their opinions. After selecting the save button, a workflow created using Power Automate initiates, invoking the Sentiment Analysis artificial intelligence model within AI Builder. The Sentiment Analysis model automatically detects and categorizes the content of text written in English.

The code written in Power Fx language has the following form:

```
Set(TextInputSentiment, 'Sentiment
analysis'.Predict(TextInput1.Text).Document.Top
Sentiment);
IfError(TextInputSentiment,
Notify(FirstError.Message,NotificationType.Error
));
Patch(finals,Defaults(finals),
{
Title:TextInput1.Text,
Sentiment_Type:TextInputSentiment.Name,
Confidence:TextInputSentiment.Confidence * 100
& " % "
})
```

Texts entered by users and corresponding sentiments are stored in a database created in Azure SQL. The SQL query counts the received responses by sentiment:

**select results, count(surveys) as countsentiment from survey group by results**

For this study, a newly implemented service within the Enterprise Resource Planning (ERP) system, which was operating in a testing mode, was chosen. Employees were tasked with evaluating the performance of this service, identifying both its strengths and weaknesses, and providing recommendations for improvement.

As can be seen from the Table, the artificial intelligence model of automatic content recognition accurately estimated the content of positive and negative content. Answers 2, 3 and 7 in the Table have a neutral rating. If the response given by the user does not clearly reflect positive or negative content and specifically describes the performance details of the embedded service, then the AI model for automatic content recognition assigns it a neutral rating. In this case, it is the neutral content that contains important information for the company.

Thus, research has shown that in this particular example, it is preferable for a person to rate neutral content. Therefore, on the Power BI dashboard created for the manager, only neutral content is displayed, he will be able to easily look at the neutral content and make an appropriate decision.

## Conclusion

Consequently, the research unveiled that the artificial intelligence model for automatic content recognition adeptly identified both positive and negative evaluations. Notably, neutral evaluations in the specific research held a considerable weight, warranting attention. Consequently, we devised a visualization for managers that includes not only positive and negative content but also information with neutral content. Through this approach, our designed system will assist company management in effectively processing data and making informed decisions.

**Table. Some results of the artificial intelligence model of sentiment analysis (taken from AI Builder)**

	Text	Sentiment	Sore
1	When I select Save button, the web-page freezes for a long time	negative	56%
2	I want a top menu for navigation	neutral	85%
3	I need a new web page for the departments	neutral	73%
4	The truck delivering the material arrived on time after using new software	positive	92%
5	HR documents folder contains many old documents	negative	59%
6	When I selected the Update button the data changed in the Products window, but remained the old one in the Delivery window.	negative	59%
7	When I want to change the price of a product, I have to go to three different websites	neutral	98%

ინფორმატიკა

## ნეიტრალური კონტენტის მნიშვნელობა ხელოვნური ინტელექტის მოდელით სენტიმენტების ანალიზის დროს

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საერთაშორისო ეკონომიკური ინტეგრაციის და გლობალიზაციის პირობებში ჩნდება ახალი გამოწვევები და მოთხოვნები, სადაც საჭიროა საწარმოო ორგანიზაციებში არსებულ მდგომარეობათა ძირეული გარდაქმნა. მნიშვნელოვანია საწარმოო რესურსების ეფექტური გამოყენება, ბიზნესპროცესების ავტომატიზაცია, ახალ ღირებულებათა შექმნაში მომხმარებლის და საქმიან პარტნიორთა მაღალი დონის ინტეგრაცია. მომხმარებლის გამოხმაურების შეგროვების ტრადიციული გზა კითხვარებია. სენტიმენტების ანალიზი – გრძობათა კლასიფიკაციის ამოცანაა, როგორც წესი, დადებითი ან უარყოფითი. ნეიტრალური მოსაზრებებით კომპანიები ხშირად არ ინტერესდებიან. წინამდებარე სტატია სწორედ აღნიშნული კუთხით ჩატარებული კვლევის შედეგია. აქ წარმოდგენილია ჩვენ მიერ დაპროექტებული საინფორმაციო სისტემა, რომელიც აგებულია Microsoft Power Platform-ისა და Azure SQL-ის გამოყენებით. მობილური აპლიკაციის საშუალებით კომპანიის თანამშრომლებმა მონაწილეობა მიიღეს კომპანიის მიერ ჩატარებულ გამოკითხვებში და შეაფასეს საინფორმაციო სისტემაში ჩანერგილი ერთ-ერთი სერვისის მუშაობა, ხოლო ხელოვნური ინტელექტის მოდელის (Sentiment Analysis) გამოყენებით მოხდა მონაცემების დამუშავება. კვლევის შედეგად გამოიკვეთა, რომ შინაარსის ავტომატური ამოცნობის ხელოვნური ინტელექტის მოდელმა ზუსტად შეაფასა დადებითი და უარყოფითი შინაარსის კონტენტი. თუმცა, თუ მომხმარებლის მიერ გაცემული პასუხები კონკრეტულად აღწერს ჩანერგილი სერვისის მუშაობის დეტალებს, შინაარსის ავტომატური ამოცნობის ხელოვნური ინტელექტის მოდელი ანიჭებს მას ნეიტრალურ შეფასებას. შეიძლება ითქვას, რომ ისეთი ტიპის ამოცანებში, სადაც გამოკითხვაში მოითხოვება კონკრეტული შენიშვნების აღწერა, ნეიტრალურ შეფასებებს აქვს გარკვეული დატვირთვა. ამიტომ ჩვენ მიერ წარმოდგენილ სისტემაში მენეჯერისთვის შექმნილ Power BI dashboard-ზე გამოტანილია დადებითი და უარყოფითი შეფასებების რაოდენობა და ასევე ნეიტრალური კონტენტიც, სადაც მენეჯერს აქვს შესაძლებლობა მარტივად გადაავლოს თვალი ნეიტრალურ კონტენტს და მიიღოს შესაბამისი გადაწყვეტილება.

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