

CSE3119 - Robotic Process Automation

Project Report

Course Feedback Analysis

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ABSTRACT

Sentiment analysis is the process of identifying and classifying the emotions and opinions conveyed in a text, such as customer feedback, social media posts, or product reviews. The objective of sentiment analysis is to determine if the overall tone of a text is positive, negative, or neutral. This project presents a study on course feedback analysis using UiPath's robotic process automation (RPA) platform. The objective of this study is to develop an automated system that can extract feedback responses from an Excel sheet, and perform sentiment analysis on the data using UiPath's AI Center. The proposed system then generates personalized email templates using UiPath's email automation capabilities based on the outcomes of sentiment analysis. The email templates include specific recommendations and suggestions derived from an analysis of the feedback's sentiment. The system assists instructors in identifying areas for course development and communicating the personalized results of feedback analysis to respondents. This can help in improving the quality of courses in educational institutions.

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1. Introduction

The process of accumulating, analysing, and interpreting student feedback data regarding their learning experiences in a course constitutes course feedback analysis. It entails collecting student feedback through surveys or questionnaires, analysing the feedback data to identify areas for improvement, and taking action to improve the content of the course. Traditionally, the analysis of course feedback is performed manually, which is a time-consuming and error-prone procedure. With the advent of robotic process automation (RPA) and artificial intelligence (AI), it is now possible to automate the process and improve its accuracy and efficacy. The proposed system makes use of UiPath's RPA tools to automate the process of extracting feedback responses from Google Forms. The feedback text is then subjected to sentiment analysis by UiPath's AI Center, which is trained using machine learning techniques to accurately categorize feedback as positive, negative, or neutral. The UiPath AI Center is an artificial intelligence (AI) platform designed for robotic process automation (RPA) that enables users to develop, deploy, and manage AI models. It offers an integrated environment for AI development in which users can build and train AI models and deploy them directly into UiPath workflows. It offers a variety of tools and services, such as natural language processing (NLP), machine learning (ML), and computer vision (CV), which can be used to automate complex business processes with custom AI models. After performing sentiment analysis on the course feedback data, the system creates customized email templates using UiPath's email automation. The proposed system has several advantages over traditional course feedback analysis methodologies. It eliminates the need for manual data entry and processing, saving time and minimising errors. Utilising AI and machine learning techniques, the system provides a more precise and objective analysis of feedback data.

2. Literature Review

Raju et al. proposed a model that utilizes machine learning techniques to predict the ratings of a product or service based on customer feedback. The data is extracted from the e-commerce website converted to Excel using the UiPath's data extraction feature. The reviewers' sentiments are then extracted using part-of-speech taggers and comparative analysis of the retrieved study [1]. Using robotic process automation (RPA) and machine learning (ML) techniques, Patil et al. (2021) investigated the development of an insurance fraud detection system for motor vehicles. The authors propose a model capable of analysing vast quantities of data to identify fraudulent claims and reduce insurance companies' financial losses. The authors use RPA to extract and compile data from various sources, including claim forms and databases, for analysis. This data is then used in the UiPath's AI Center which takes care of the machine learning component [2]. Sharma et al. presented a study on the development of an e-commerce product comparison portal for consumer data classification using data mining. The authors propose a novel method that employs data mining techniques to classify customer data and provide personalized product suggestions. Data scraping of features such as product name, product price, product reviews and ratings associated with suggested products from Flipkart and Amazon is performed using UiPath robotic process automation tool. These bots are used to scrape data from Flipkart and Amazon, perform cleaning operations, and dump the data into a database for future use [3].

Ashar et al. present a study on the development of an automated email response system based on sentiment analysis. The authors propose a novel method that uses sentiment analysis to classify and generate automated responses for customer emails [4]. Patel et al. present a study on the use of machine learning and robotic process automation (RPA) to develop a customized automated email response tool. The authors propose a novel method that combines RPA and machine learning to create a bot capable of autonomously responding to customer emails. In order to improve the user experience by automating email responses with proper classification and expeditious scheduling, the authors present a novel solution for formulating automated responses to emails based on their priority, after proper classification [5]. Parchande et al. proposed a contractual employee management system that uses machine learning and robotic process automation (RPA) to automate administrative tasks associated with the management of contractual employees. The authors utilise RPA to automate the collection and administration of

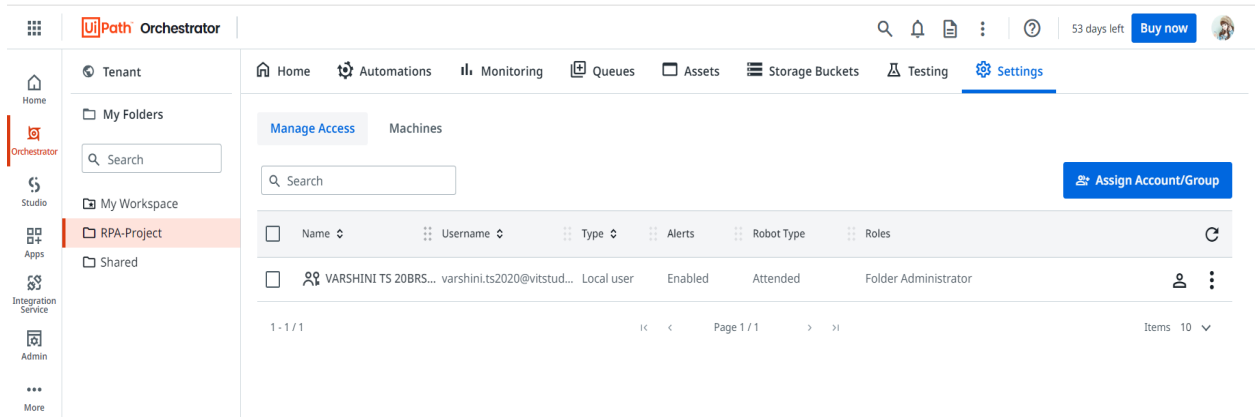
employee data, including the collection of employee information, documentation, and contract renewals [6].

Khare et al. (2021) proposed an e-mail assistant system for automating e-mail handling and management using Robotic Process Automation (RPA). The system is designed to reduce the workload on humans in handling large volumes of e-mails by automating repetitive tasks. The proposed system is evaluated using a real-world dataset of e-mails. The results demonstrate that the system can accurately classify and route e-mails to the appropriate individual or department. Additionally, the system can reduce the time and resources required for handling and managing e-mail, thereby enhancing productivity [7]. Baidya (2021) explored the use of robotic process automation (RPA) and machine learning (ML) techniques for document classification and analysis. The author emphasizes the significance of document classification in industries where large volumes of documents must be processed, such as banking, insurance, healthcare, and legal services. Data from medical reports, discharge summaries, and prescription orders was extracted using RPA [8].

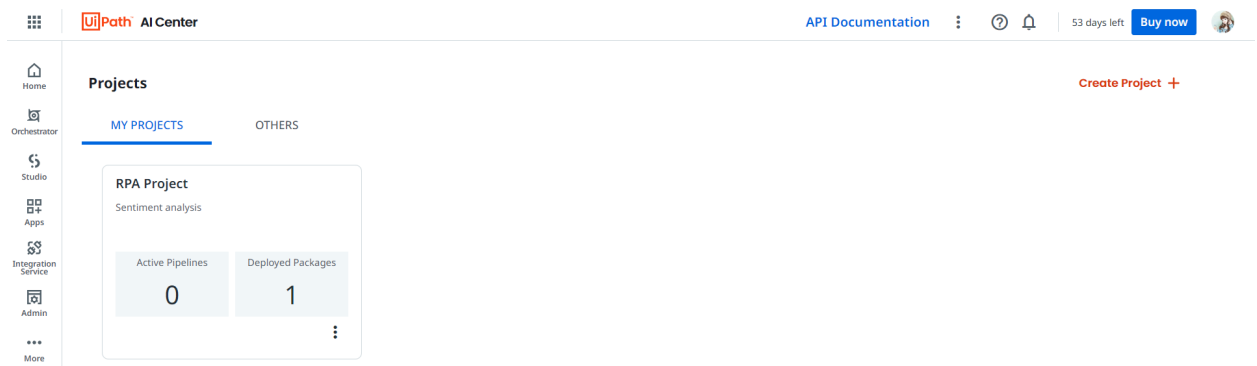
The focus of Leopold et al. was to identify candidate tasks for robotic process automation (RPA) in textual process descriptions. The authors utilised a combination of text mining and manual analysis to identify potential RPA tasks in 243 textual process descriptions from a variety of domains. The research identified 14 types of RPA duties that can be automated, such as data entry, data retrieval, data transformation, and decision-making. The majority of potential RPA tasks are associated with data entry, suggesting that RPA can substantially reduce the workload associated with manual data entry [9]. Gupta et al. demonstrate how RPA can be used to automate various admission-related tasks, such as data entry, data validation, document verification, and fee payment processing. According to the findings of the study, the RPA-based admission management system can significantly reduce application processing time from several days to just a few hours. The system is also extremely precise, with minimal data entry and processing errors [10].

3. Methodology/Implementation

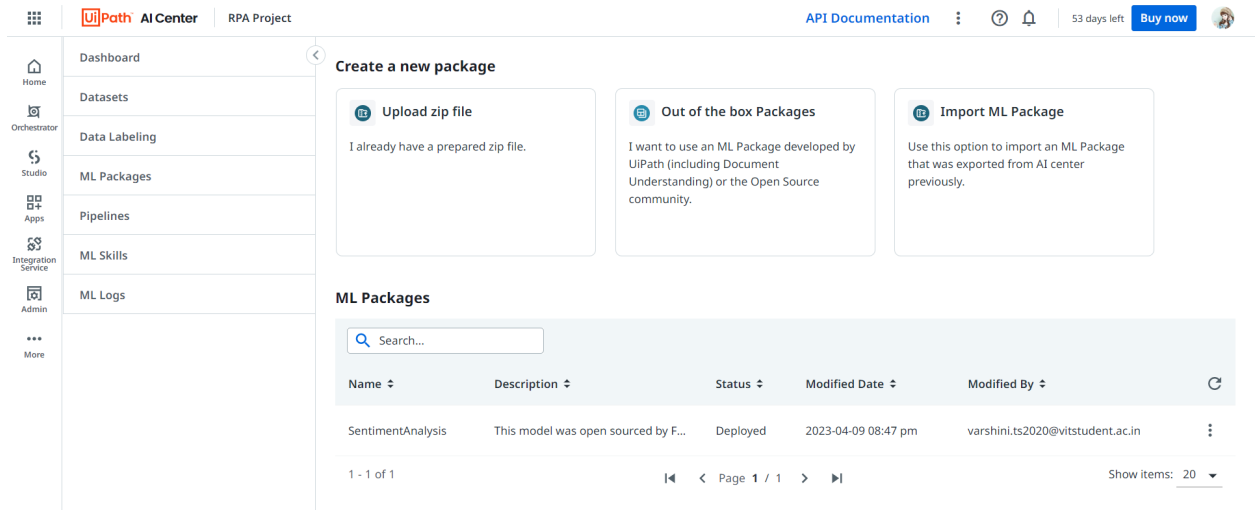
1. Open UiPath orchestrator, sign in, and create a folder and a robot



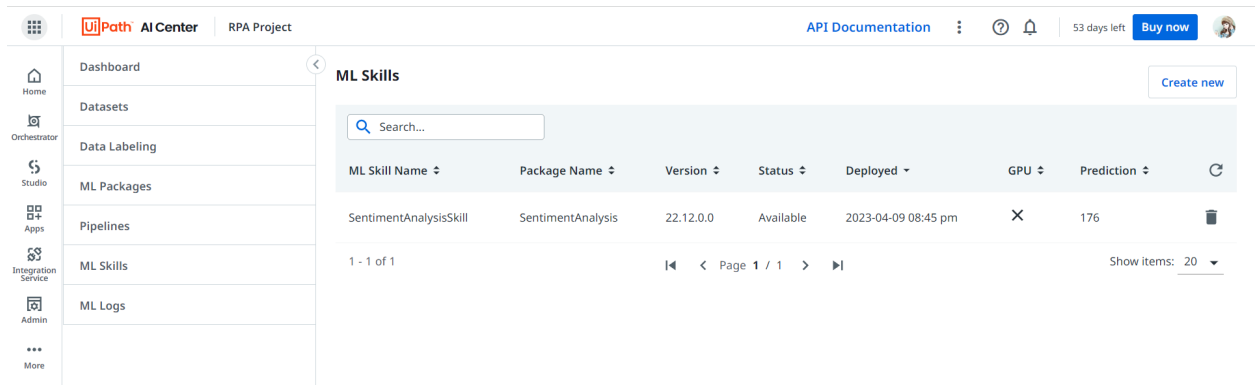
2. Open UiPath AI Center, create a new project with a name of your choice



3. Click on the newly created project, click on ML packages, then click on “Out of the box Packages”, then click on “Language Analysis”. Then click on “SentimentAnalysis”. After that click on submit button, write a package name, and then click submit. You will have a ML package as shown below



4. Click on ML skills, then click on “create new”. Give the skill a name, choose the previously created ML package, choose the correct versions, and click create. You will have created an ML skill as shown below:

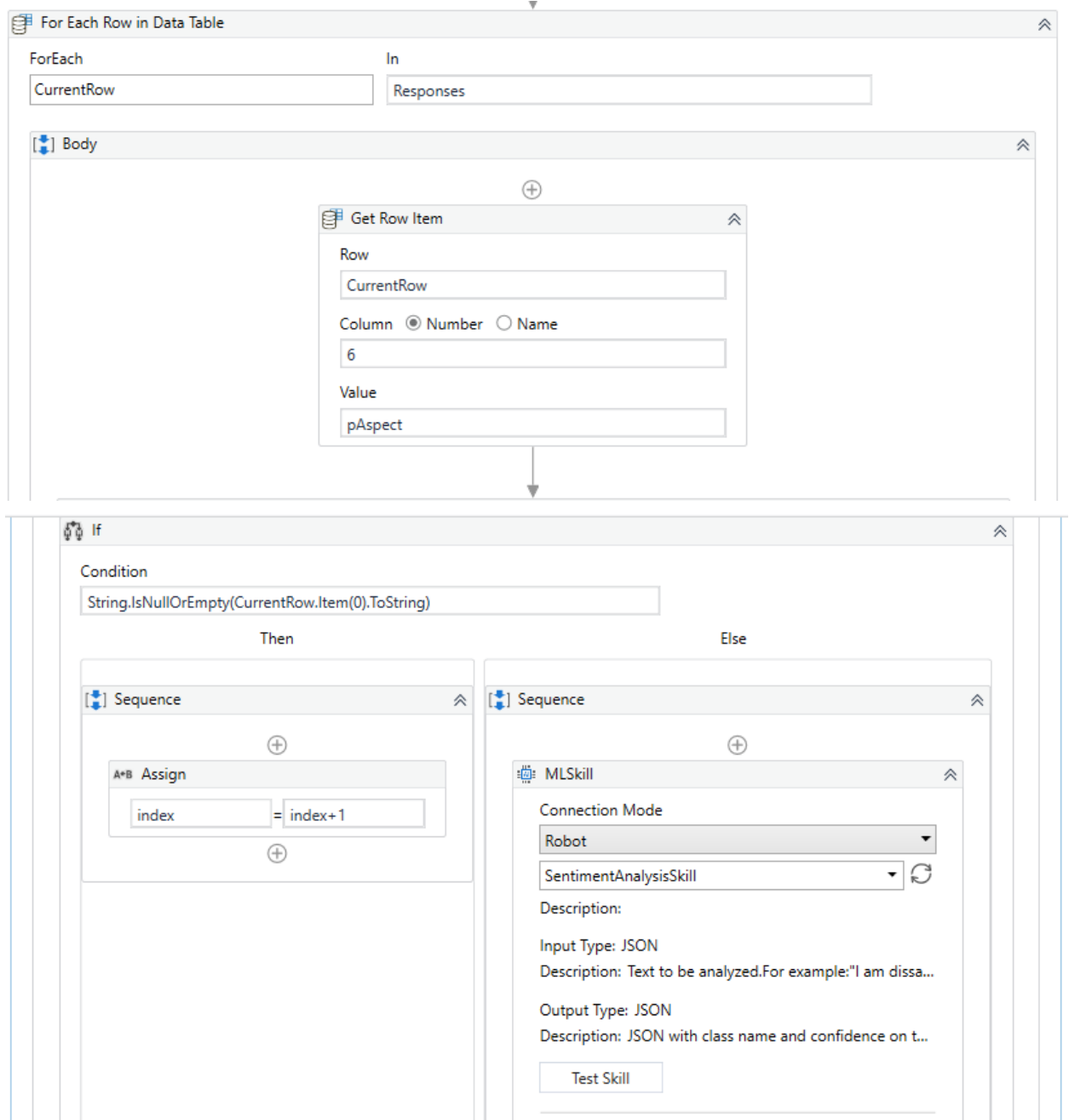


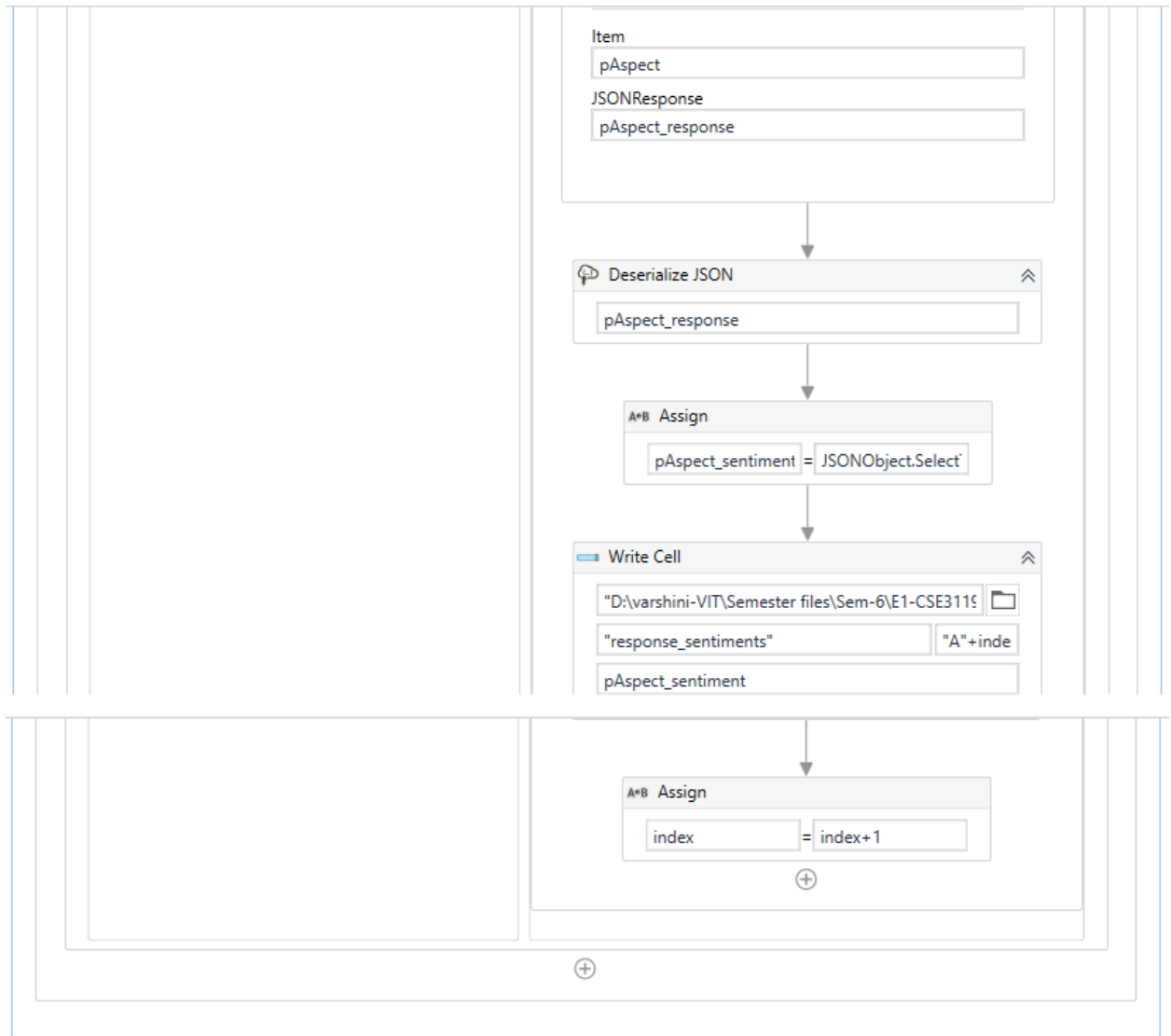
5. Open UiPath Studio, create a new blank process and name it. Install 2 packages, uipath.MLServices.Activities, and uipath.WebAPI.Activities. For this project 3 workflows are used
 - a. SentimentAnalysis.xaml
 - b. AverageSentiment.xaml
 - c. EMailAutomatiom.xaml

All the workflows are called in workflow Main.xaml

6. SentimentAnalysis.xaml workflow analyzes the sentiment of different fields in the dataset and writes the sentiment of each entry for all different field in a separate sheet of the excel

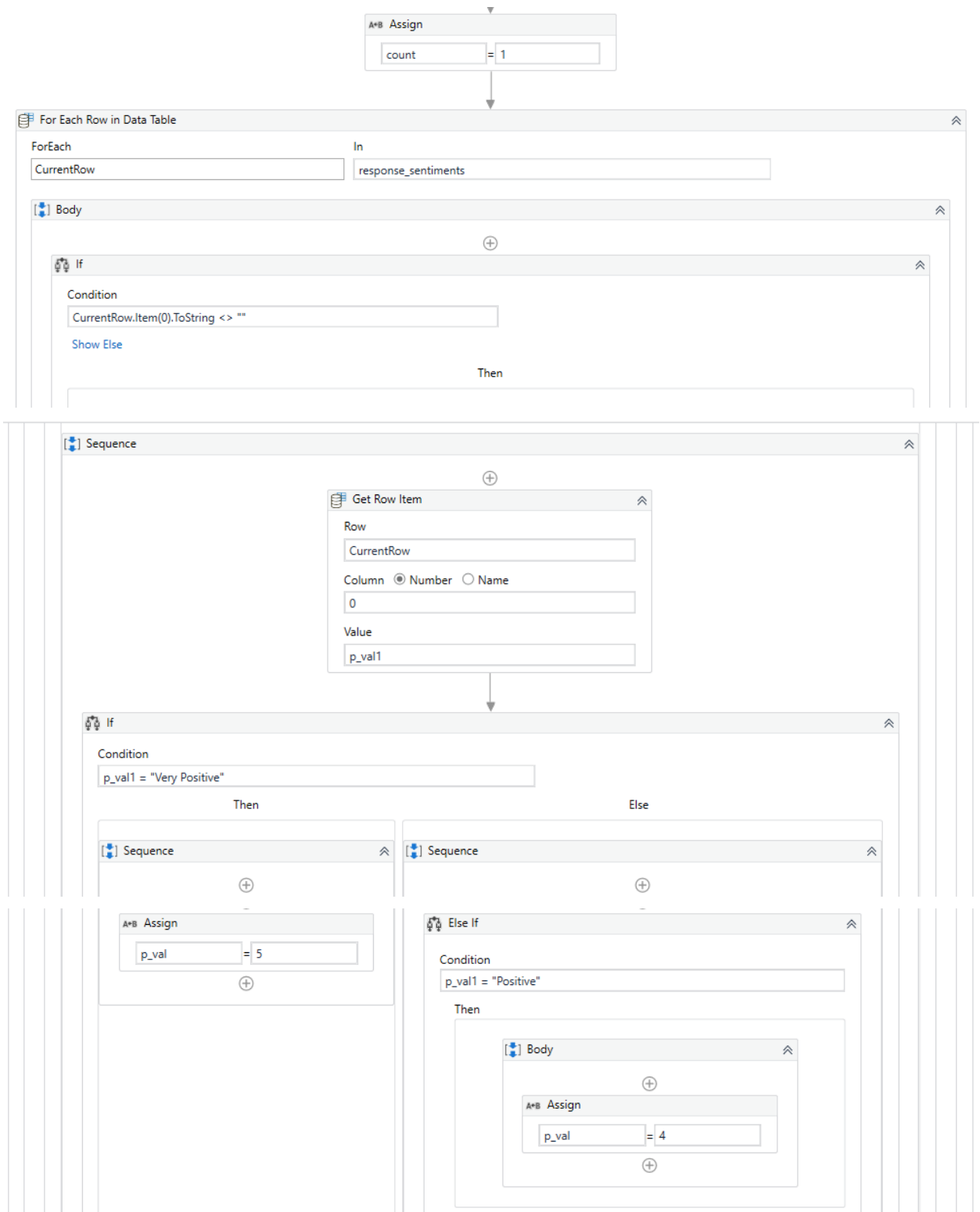
The workflow of SentimentAnalysis.xml for the field positive_aspect is as follows:

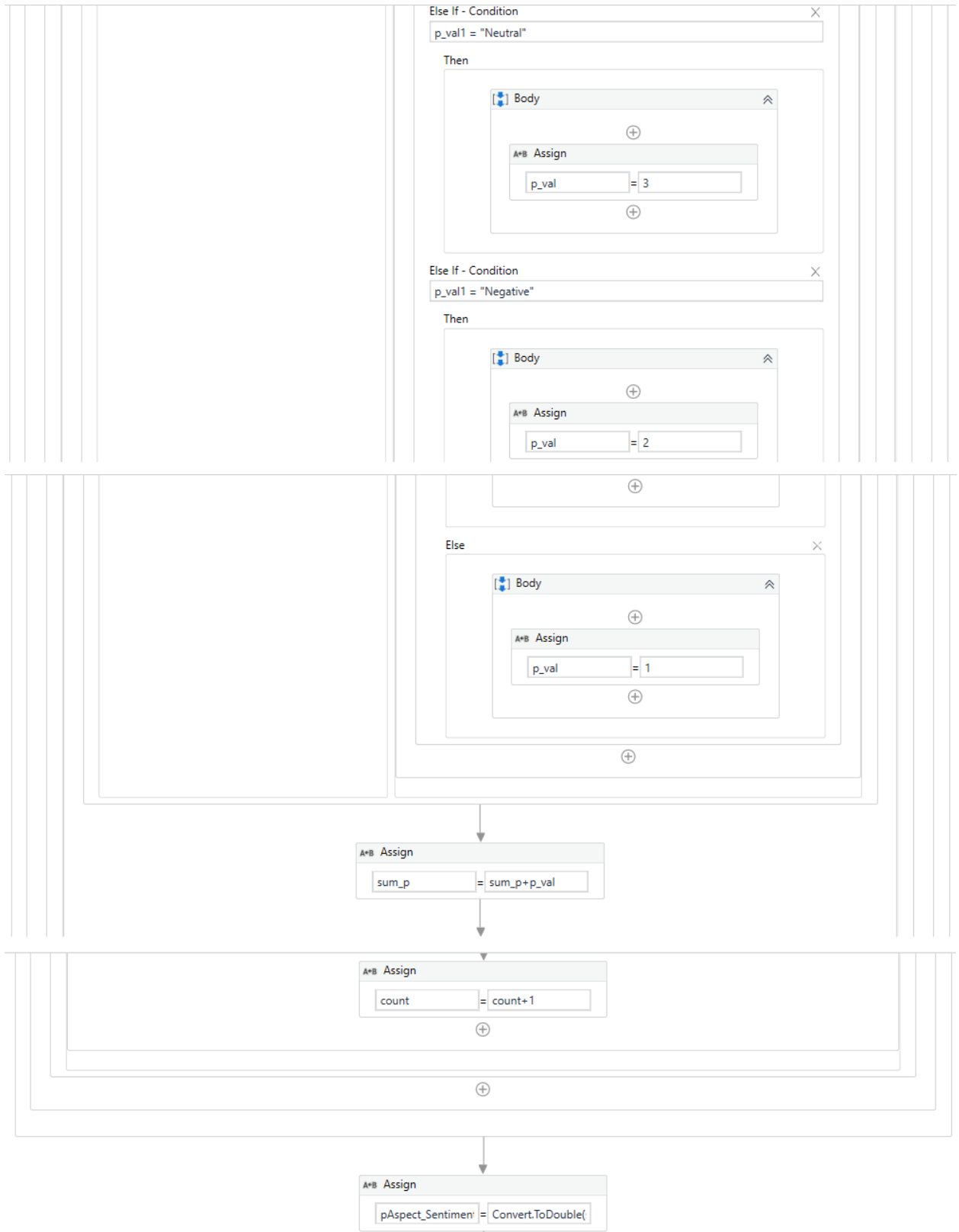


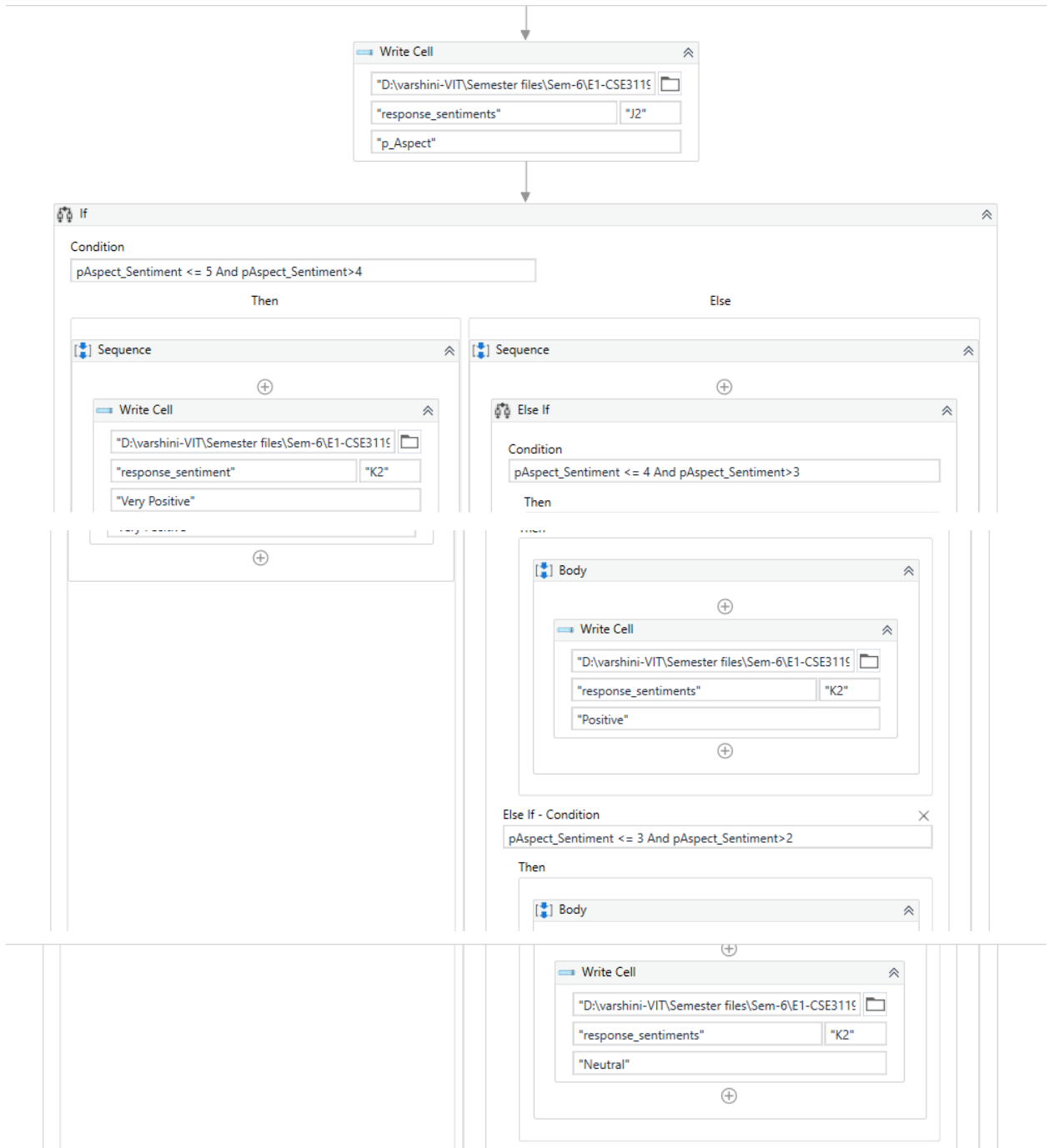


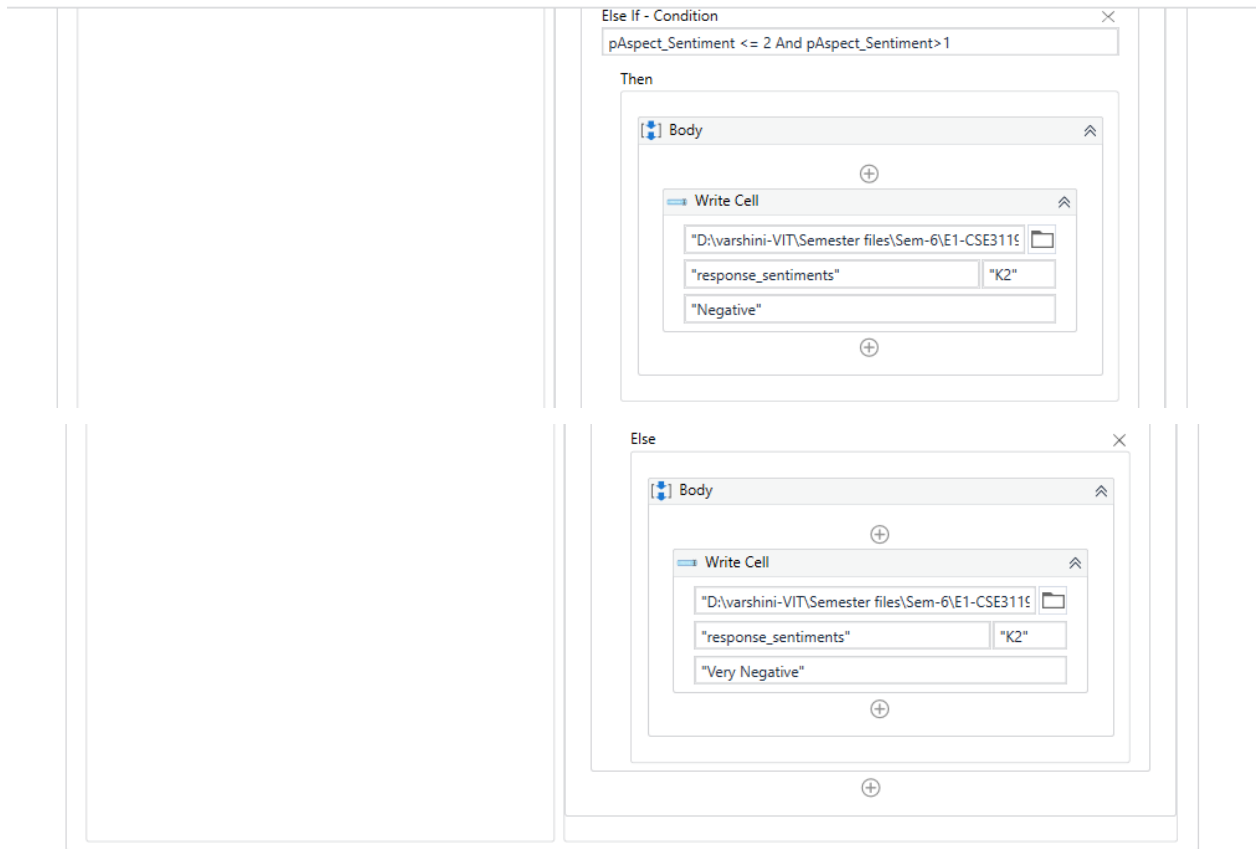
The same procedure is followed for other fields.

7. AverageSentiment.xaml finds average sentiment of all the fields using the previous values predicted. Sample workflow for the field pAspect_sentiment is as follows





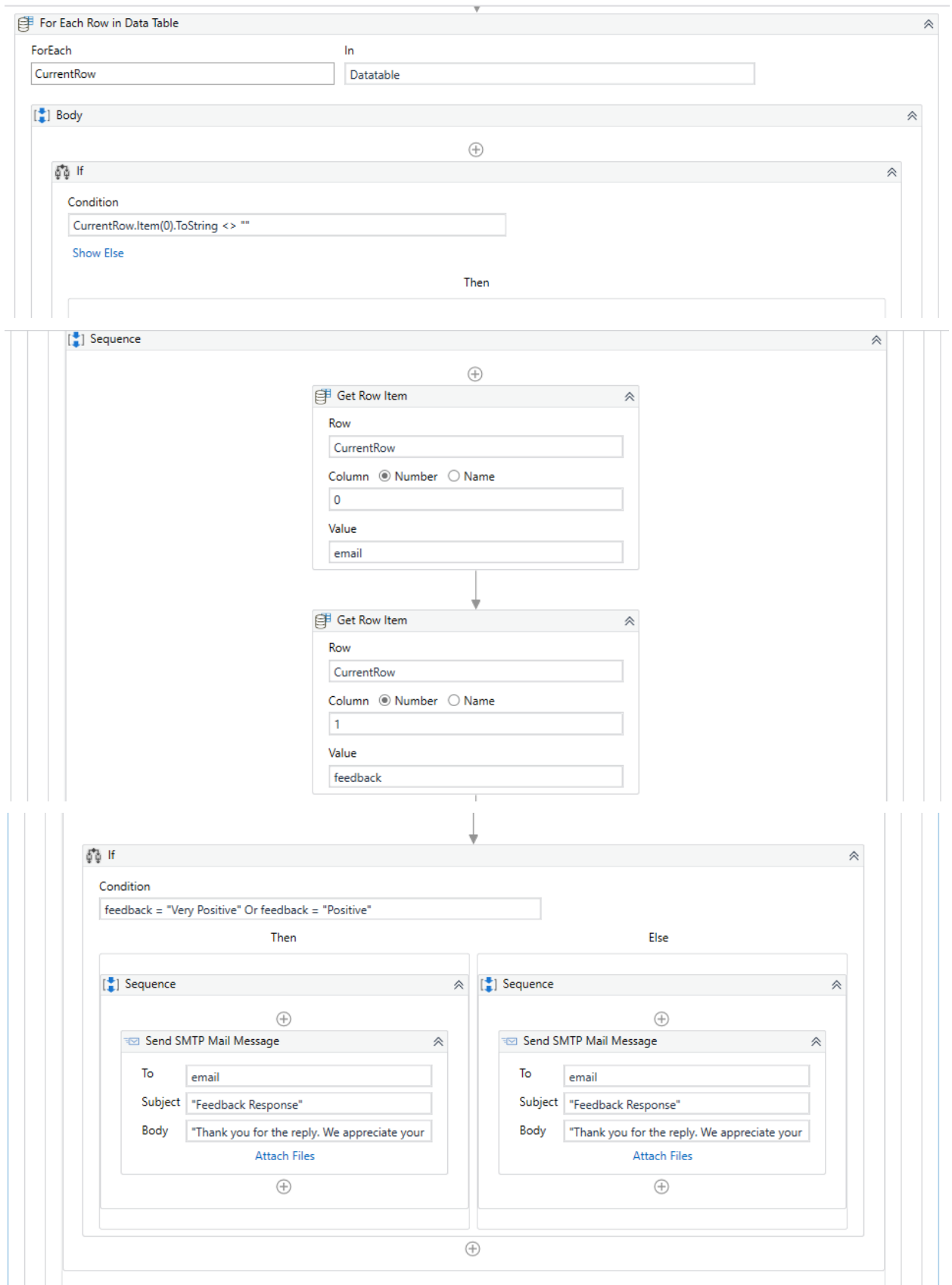




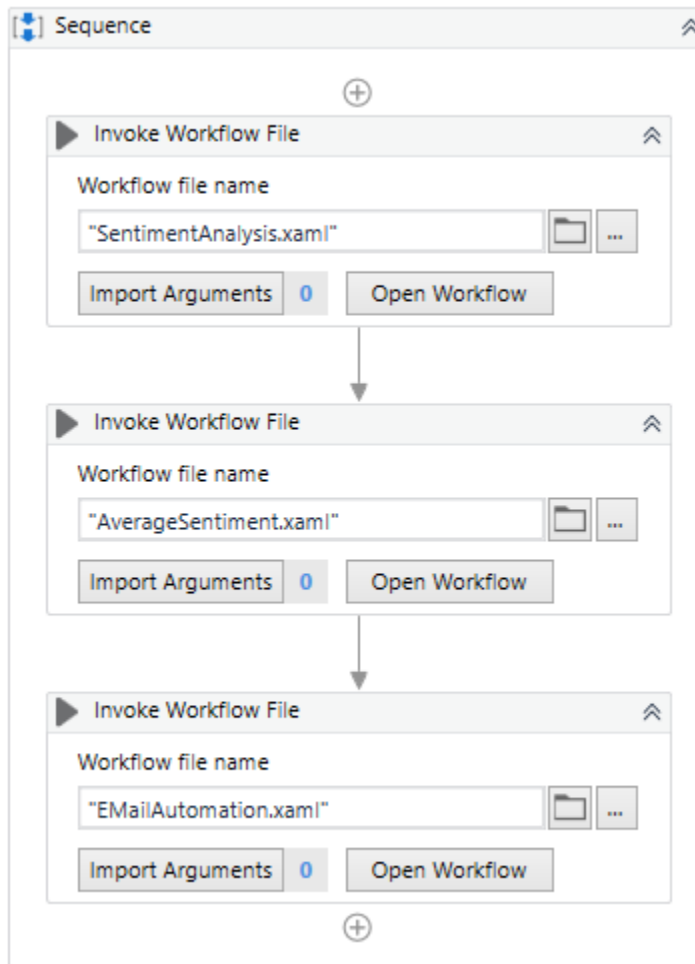
The same procedure is followed for other fields

8. EMailAutomation.xaml extracts email and its corresponding sentiment analysis value for the field feedback. Based on the sentiment analysis value of this field, an automated email is sent.

The workflow is as follows



9. Main.xaml workflow invokes all these three workflow



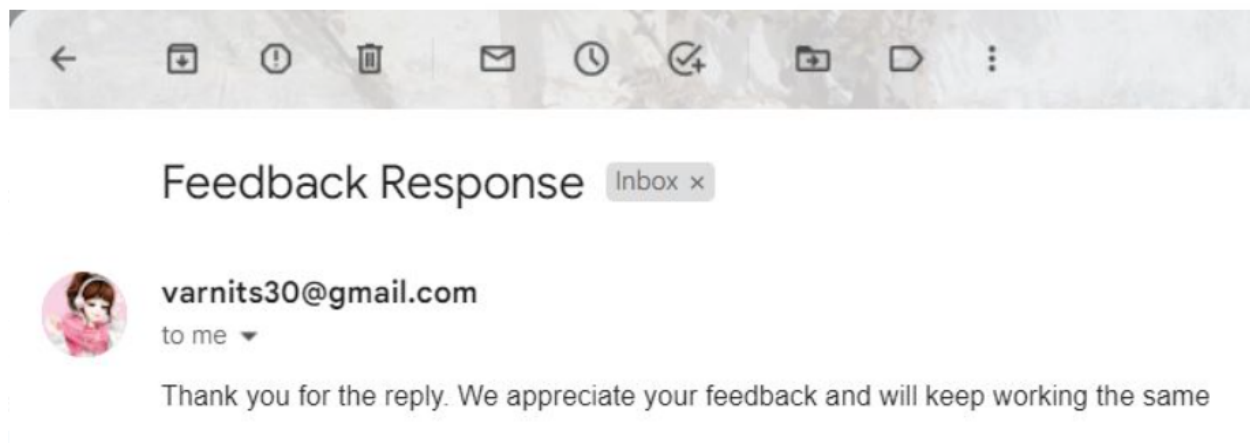
4. Results and Discussion

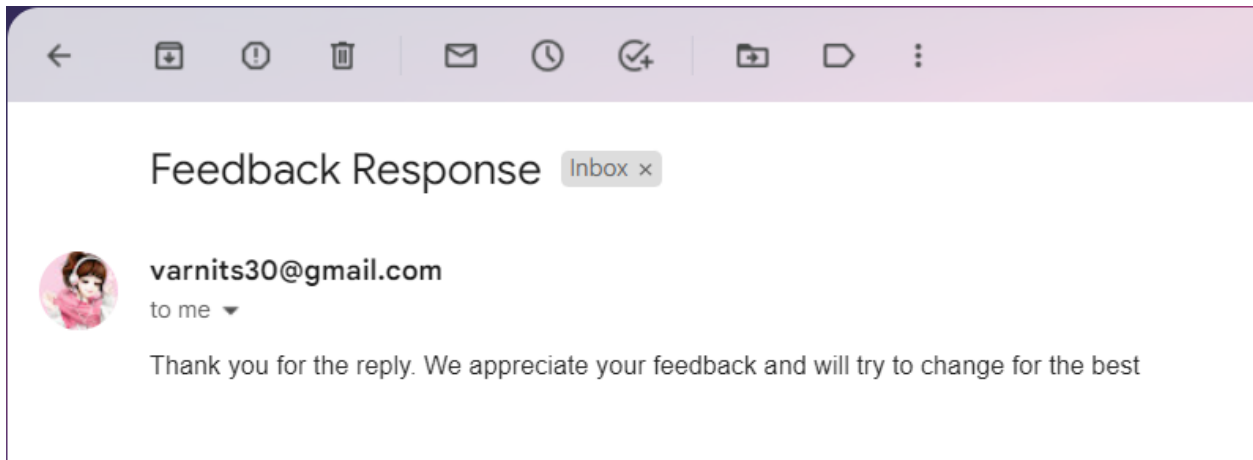
The implementation of the course feedback analysis using UiPath proved effective for enhancing the course's quality and determining the level of student satisfaction. The system accurately extracted responses from the Google Form and transferred them to an Excel sheet with few errors. After the data was transferred to Excel, UiPath's AI Center was used to conduct sentiment analysis. The results of the sentiment analysis were then used to generate personalised email templates that were sent to respondents using the email automation features of UiPath. Overall, the UiPath-based course feedback analysis system proved to be an efficient and effective method for collecting and analysing student feedback. The automation capabilities of UiPath significantly reduced the time and effort required to complete these duties, enabling instructors to focus on enhancing course content and delivery.

The output of sentiment analysis and average sentiment are as follows:

	A	B	C	D	E	F	G	H	I	J	K	L
1	pAspect_S	nAspect_S	improve_S	feedback	choose_Sentiment						Average Sentiment	
2	Positive	Positive	Neutral	Negative	Neutral					p_Aspect	Positive	
3	Positive	Negative	Very Nega	Negative	Neutral					n_Aspect	Neutral	
4	Negative	Negative	Neutral	Positive	Neutral					improve	Neutral	
5	Very Posit	Negative	Neutral	Neutral	Neutral					feedback	Neutral	
6										choose	Neutral	
7												

The output of email automation are as follows:





5. Conclusion and Future Work

In conclusion, the implementation of course feedback analysis using UiPath and its various features has demonstrated great potential for streamlining the process of accumulating and analyzing instructor feedback and providing instructors with meaningful insights. The use of AI and sentiment analysis has increased the analysis' precision and efficiency, thereby reducing the workload of instructors. The system also includes email automation, which ensures timely and individualized feedback delivery to respondents. This improves the overall user experience and encourages future feedback from the respondents.

In terms of future work, the system can be improved by integrating natural language processing and chatbots to provide a more interactive feedback experience. In addition, the system can be expanded to encompass feedback from multiple sources, such as social media and online forums, for a more comprehensive analysis of feedback. In addition, the system can be integrated with learning management systems to provide instructors with real-time feedback, which can assist them in making informed decisions and improving the overall course quality. Additionally, UiPath can be integrated with other tools, such as learning management systems, to provide a more comprehensive analysis of the feedback. In addition, UiPath can be used to automate other duties associated with course feedback analysis, such as scheduling and facilitating participant focus group discussions. This can aid in obtaining more in-depth feedback and provide a more holistic view of the experiences of participants.

6. References

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