



(St Clair's AI buddy to help students know more about the College)

Group – 001

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Data Analytics for Business

DAB 106 – Introduction to Artificial Intelligence

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Problem Statement:

A campus guide is essential for any educational institution. Newly enrolled students and prospective students have a comprehensive list of questions to be answered at the beginning of every academic year to give them a good understanding of the courses and the college. This implies that the university's staff and teaching members are burdened with the extra task of introducing new students to the ladders and fielding the same set of inquiries at the beginning of each academic year. Educational institutions may find it difficult to encourage students to maintain contact with vital information and services while they are enrolled in college. Institutions require campus guides primarily for this reason. Colleges must make sure that students have access to the crucial information and tools they require as they go through their time in school.

Every year millions of students look for courses and colleges in Canada for their higher education and St Clair College is one of the most sought-after institutions, its website also faces high traffic with an audience looking for various types of available information. With so many courses and services that the college offers, listed on the official website, some students can get lost/confused while looking

for appropriate information. To make the path of incoming users(students) easy and make them reach their goals in a handful number of steps is the main objective of our Project.

Project Proposal:

Conversational AI can automate processes that are presently done by humans, which will save expenses and decrease human error. Assisting clients round-the-clock when human agents are not there, can deliver a more personalized and interesting experience. One such form of conversational AI is a Chatbot. It is used frequently in apps and websites for customer care to respond to queries and help as and when needed by the user. Chatbot systems are often subject to continual testing and adjustment because many of them in use are unable to communicate as effectively as a human discussion partner. With a large number of students, the entire process of inquiry and solutions can be performed repeatedly, and it will always be just as effective as the first time. Institutions accepting applications from students from other countries should be prepared to address their questions and concerns after office hours. Building chatbots is an affordable and useful way to accomplish anything. They can be used by colleges and universities to keep students informed about school tests, extracurricular activities, and events

throughout the semester. Two paths could be taken in this. Students can directly ask the chatbot for information by asking questions.

First impressions have an impact. Leading universities and colleges from across the world have been developing college chatbots for their websites for the past few years. These chatbots can serve round the clock as campus guides. They are also easier to work with than human reps because they do not require supervision. All that is required of them is to access the university's website and enter their inquiry into the chatbot. Colleges that develop chatbots for students result in a more simplified procedure of information sharing that happens quickly. Inquiry chatbots for colleges have revolutionized how educational institutions run all over the world and helped students all the way through their studies. Students do not have to waste time attempting to figure out to whom to ask their questions in real-time. The college's inquiry chatbot will take their questions and direct them. In addition to maximizing the staff's valuable time, chatbots can assist our college make a fantastic first impression on website visitors. Perhaps, it is one of the best reasons for our own institute to have a chatbot on its website. Being highly regarded for its technical and IT courses, St. Clair College would benefit from having a chatbot on its official website to support that reputation.

St. Clair College's website would benefit from an AI guide to help students provide information about what they need in a few steps. A student or a user also may need to access various courses and might have to check various facilities offered by the college at the same time for a better understanding and the decision-making process. This can also be done using a chatbot as it might cause hassle if assisted manually. The chatbot must be able to comprehend the user's aim to guide users toward their desired actions. It calls for a combined effort between human knowledge and artificial intelligence, including NLP, NLU, Machine Learning, Deep Learning, and other technologies. With the help of Language Studio and Azure platform, our Team will be creating an AI Chatbot that will be a guide for students telling them about our various courses and a little description of what the program will offer them. We will be calling this Chatbot '**Dux**' meaning "guide" in Latin. This easy-to-use function is a significant step towards a tech-savvy, multicultural society where every student feels safe, especially as St. Clair College would be opening its doors to more and more international students and student exchange programs. Furthermore, Dux will be able to show different services provided by the college to the students and a 360 Virtual Tour of the college and its infrastructure. A chatbot that provides helpful

content and makes users feel important will be well-liked by students and other users.

Dux can be a better option for the website as it will be able to distinguish between different courses through program codes to accurately show what the user is asking for. Having an AI chatbot can also solve the problems of people using abbreviations as it is trained with multiple data and alternatives and will be able to recognize them. While sharing a little description about the courses, Dux will also share the course's page link so that interested students can directly visit it and fill out the application form to be future students. Foreign students can log in at any time and ask inquiries about their choices of courses, and academic concerns using St. Clair's Dux on the webpage. Dux aims to guide each user smoothly through the official website of St. Clair and the courses the institution offers to each student as per their interests and requirements.

Challenges/Failures:

Incorporating chatbots in our college site will be beneficial because it will help to produce effective results in a shorter amount of time. However, developing one that satisfies all our organization's requirements might be somewhat difficult. As far as we are aware, we are speaking with software powered by artificial

intelligence, which gives the talks a sense of losing their human element. The conversations could come off as stilted and artificial, devoid of individuality. It might result in a clumsy, even annoying, user experience that draws less user attention and causes a user to lose interest in an engagement midway through. Therefore, the character of a Chatbot is crucial. Prior to presenting Dux to our audience, it was crucial to assess the situation and put effective, well-thought-out measures into place.

While creating Dux, we faced a major difficulty while feeding data to Dux for training. We wanted to build a hierarchy of information and train Dux so that students can click a few filters while the conversation is going on, telling it what exactly they want. For such a hierarchy we needed pairs to relate to each other in a tree form where the initial question is the main trunk and the rest questions spread as its branches.

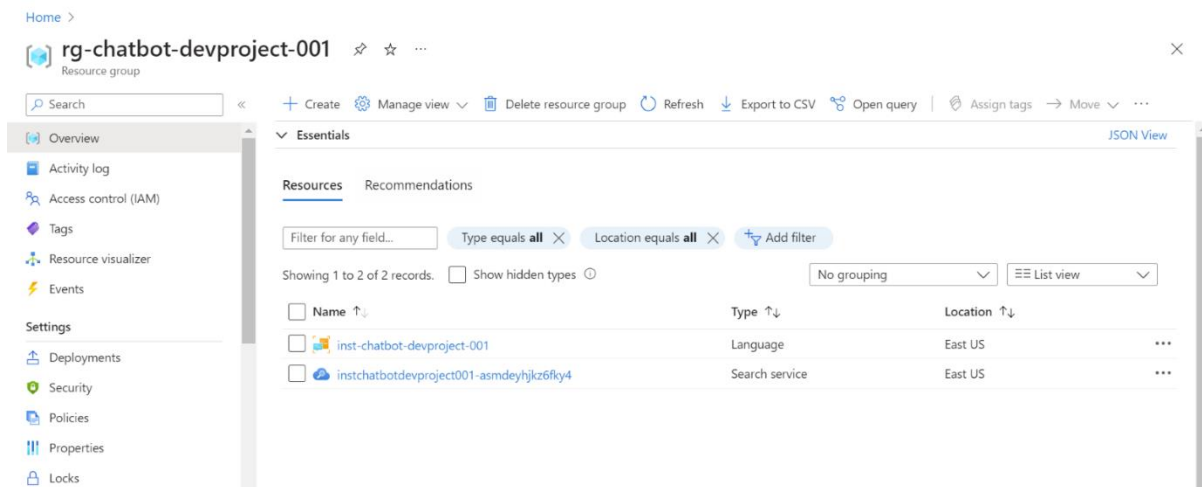
To solve this problem, we connected pairs with each other through follow-up prompts to make a context tree. The context tree shows how our top branch is splitting into further smaller ones. We made a few of these context trees to split the information in a systematic way. Also, feeding this organized data to Dux will

help it to understand the data in a better way with comparatively less training required.

With so many courses and services that are being provided by St Clair College to their students, we were not able to feed everything to Dux and hence, we had to work on a sample data where only a few of them were taken into consideration for this project. Our failure can be resolved if we can get official help from the faculty to help us better understand the flow of information and distinguish between important features and the features that can be ignored.

Stepwise creation of Dux(AI chatbot) :

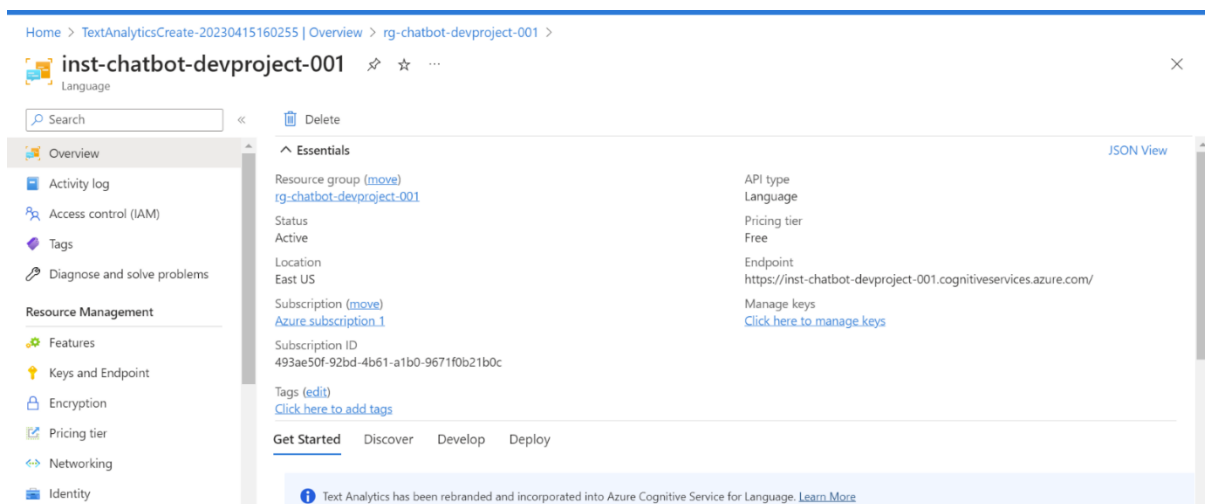
Language Service Resource Group



- Resource groups in Azure are a powerful tool that allows users to manage and organize Azure resources in a logical and efficient manner.

- By grouping related resources together, developers can streamline their workflow and simplify the management Azure environments.
- Resource groups can be used to manage resources across multiple subscriptions, making it easy to keep track of all your Azure resources.
- With resource groups, users can easily deploy, manage, and monitor their Azure resources with confidence and ease.
- As part of this project, we have created this resource group to manage all the resources which are created for chatbot creation.

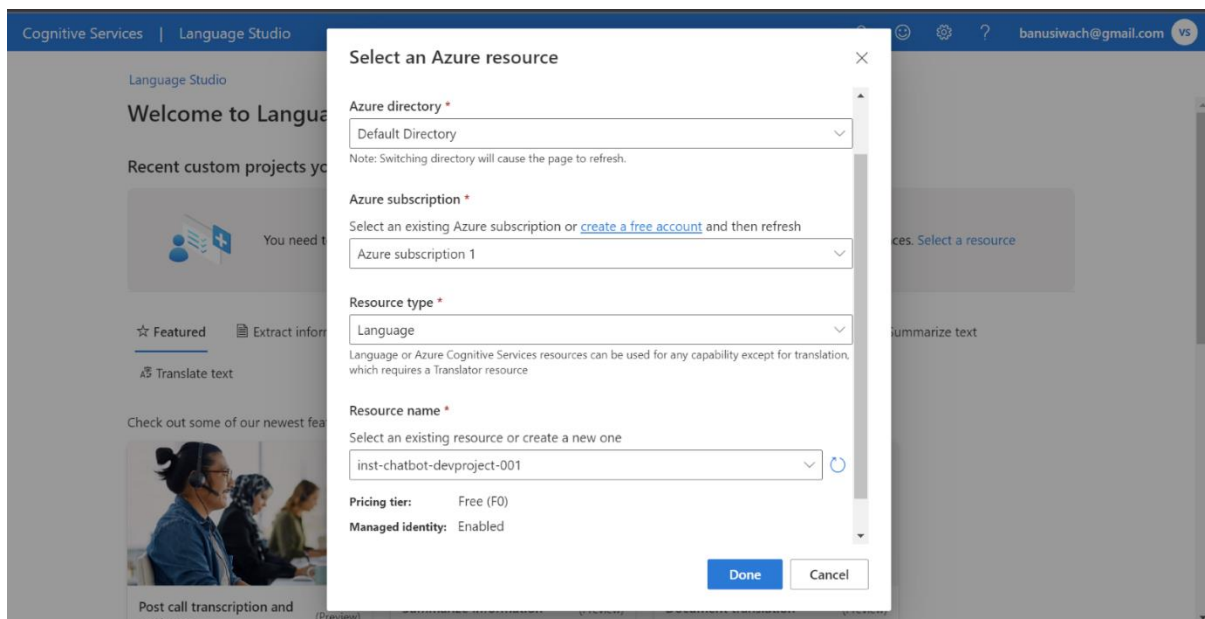
Instance details



- In Azure, an instance refers to a single deployment of a resource, such as a virtual machine, a database, or a web app.

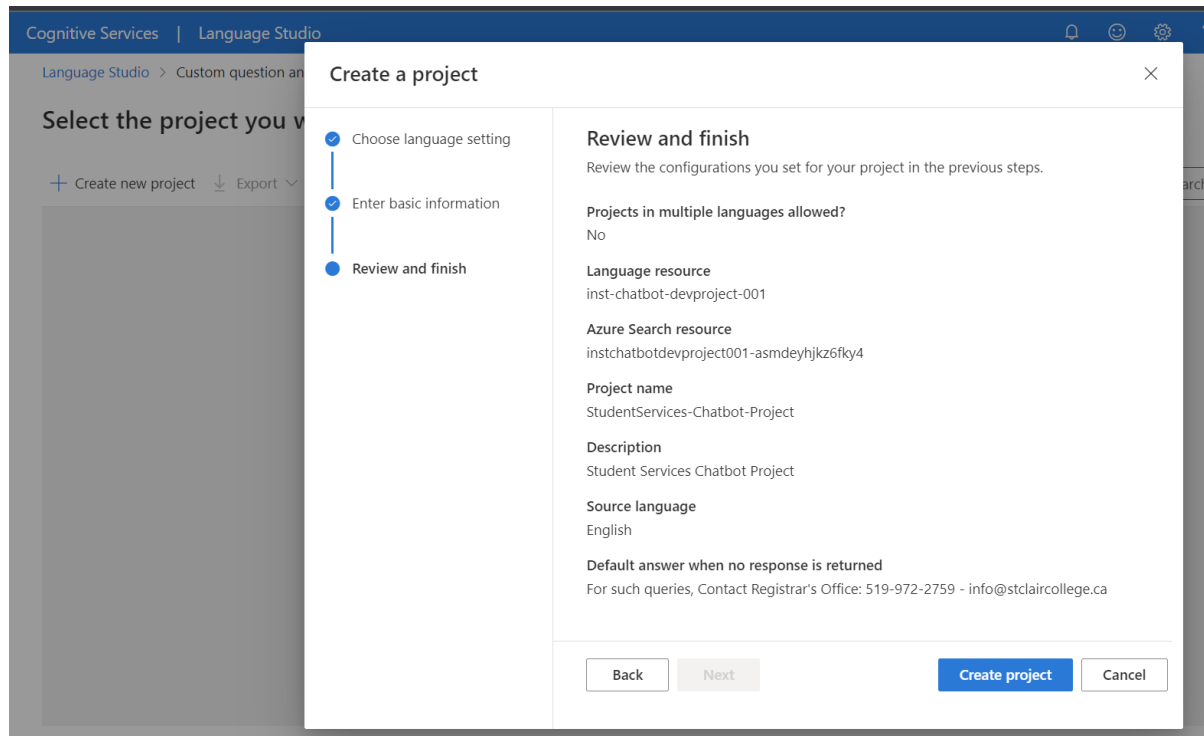
- Instances provide a way to manage and track usage, apply policies, and access controls, and monitor costs and performance in a granular and efficient manner.
- By creating instances within a resource group, we can easily group and manage related resources together, simplifying the management of complex environments.
- As part of this project, we have created an instance that will act as an endpoint for our chatbot, allowing for seamless integration and efficient communication.

Language Studio setup



- Language Studio is a powerful set of UI-based tools that enables you to explore, build, and integrate features from Azure Cognitive Services for Language into your applications.
- With Language Studio, you can easily try out several service features and see their results in a visual and interactive manner, empowering you to build better, more efficient applications for conversational AI.
- Language Studio provides you with a customizable interface that allows you to tailor the tools and features to your specific needs and preferences, making it a versatile and flexible platform.
- As part of this project, we have used Custom question answering option under "Understand questions and conversational language" option to design a chat bot.

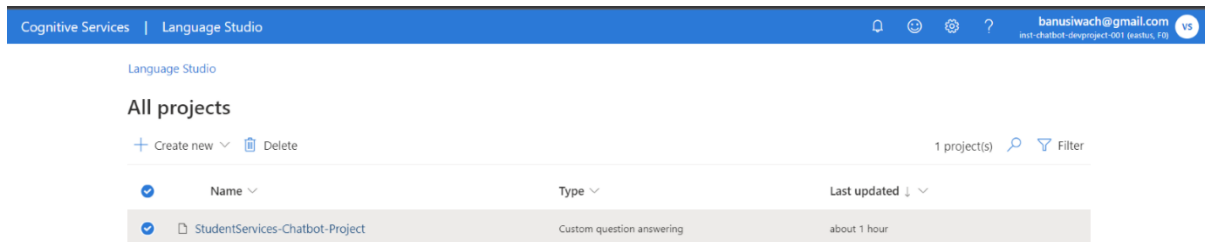
Project creation



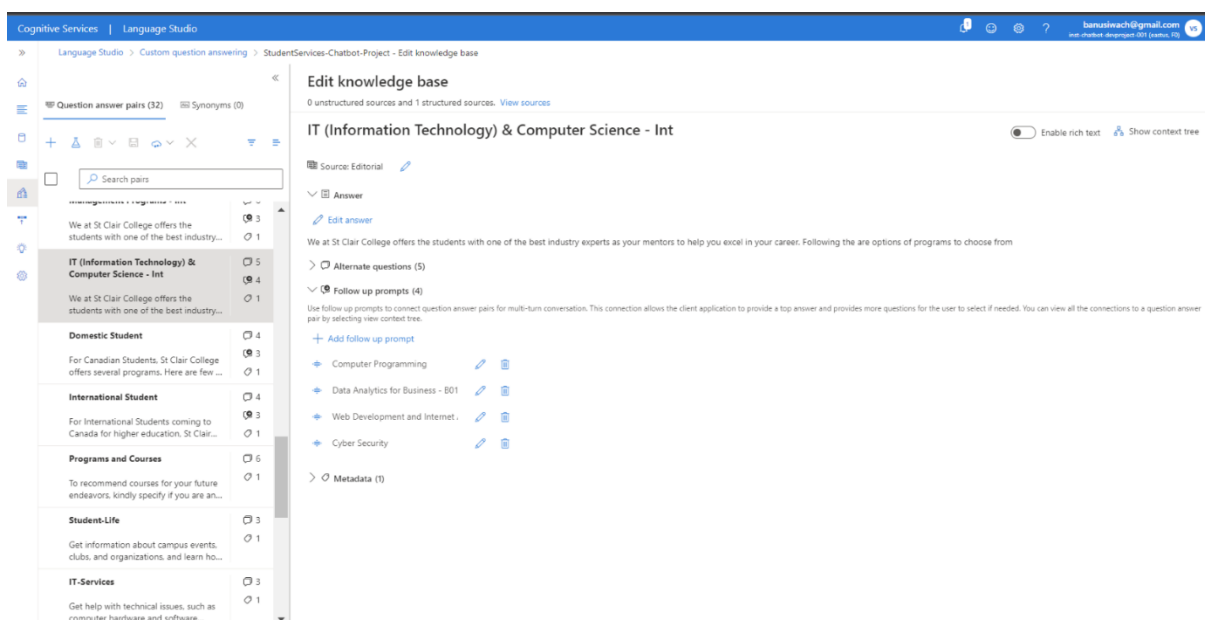
- When setting up a language-specific development environment, creating a project is the essential first step that sets the foundation for chatbot.
- To create a project, we need to specify its name, description, language, and default answer, which is the response that the chatbot will provide when it cannot understand or match the user's input.
- Once you have created the project, you can start adding the data source that will serve as the chatbot's knowledge base, containing all the questions and answers that your bot will use to interact with users.

- By adding a data source, you can ensure that your chatbot has access to relevant and accurate information that can help it respond to user inquiries effectively.
- With a properly set up project and data source, we can build and testing your chatbot, refining its responses and improving its functionality to deliver a seamless user experience.

Project Created



Knowledge base/Data



- After creating a project in the language-specific development environment, we can add custom questions and answers to create a knowledge base for our chatbot.
- The knowledge base can be built using unstructured documents or by extracting questions and answers from semi-structured content like FAQs and manuals.
- For this chat bot, we have created the knowledge base in an excel sheet by pulling the information from St Clair College website.
- As the knowledge base becomes more refined, our chatbot becomes more intelligent and better equipped to respond to user inquiries.

Testing Bot

The screenshot displays the Microsoft Cognitive Services Language Studio interface. The main window is titled 'Edit knowledge base' for a project named 'StudentServices-Chatbot-Project'. The interface is divided into several sections:

- Left Panel:** A sidebar with a search bar and a list of categories. The 'Student Services' category is selected, showing a list of questions and answers. Other categories include 'Academic-integrity', 'Accommodations', 'Virtual Tour', and 'Hello'.
- Center Panel:** The 'Edit knowledge base' section. It shows '0 unstructured sources and 1 structured sources'. Under 'Student Services', there is a list of 'Follow up prompts' (7) and 'Alternate questions' (4). The 'Follow up prompts' section includes a table with columns for 'Prompt', 'Answer', and 'Status'. The prompts listed are 'Accommodations', 'Academic-integrity', 'Career-Central', 'Health-Centre', 'Library', and 'IT-Services'.
- Right Panel:** A 'Test' panel with 'Response options'. It includes checkboxes for 'Include short answer response' (unchecked) and 'Use deployed knowledge base' (checked). Below this, there is a 'Show advanced options' link. The 'Test' area shows a chatbot response: 'Welcome to St. Clair Portal. This is dux, an AI-powered bot. I am here to assist you with any information you need. Please feel free to choose from one of the options'. Below the response are three buttons: 'Programs and Courses', 'Student Services', and 'Virtual Tour'. At the bottom, there is a text input field with the placeholder 'Type your message and press enter'.

- The above screenshot shows the testing process after feeding data through the Knowledge Base.
- The testing screen contains response options to use the deployed version of the Knowledge Base.
- By testing the Knowledge Base, developers can get an idea of how the chat will behave before creating the bot.
- This process helps to refine the chat's responses and improve the overall user experience.
- Testing the Knowledge Base is a crucial step in building a successful chatbot.

Context Tree

The screenshot displays the Microsoft Cognitive Services Language Studio interface. The main window is titled 'Edit knowledge base' and shows a list of question-answer pairs on the left and a detailed view of a selected pair on the right. The selected pair is for the 'International Student' topic, which includes an answer about St. Clair College's programs for international students. The right sidebar shows a 'Context tree' with a hierarchical structure of topics and sub-topics.

Question answer pairs (32)

- with one of the best industry experts a... 1
- IT (Information Technology) & Computer Science - Int 5
- We at St. Clair College offers the students with one of the best industry experts a... 1
- Domestic Student 4
- For Canadian Students, St. Clair College offers several programs. Here are few... 3
- International Student 4
- For International Students coming to Canada for higher education, St. Clair... 3
- Programs and Courses 6
- To recommend courses for your future endeavors, kindly specify if you are an... 1
- Student-Life 3
- Get information about campus events, clubs, and organizations, and learn ho... 1

Edit knowledge base

0 unstructured sources and 1 structured sources. [View sources](#)

International Student

Source: Editorial

Answer

[Edit answer](#)

For International Students coming to Canada for higher education, St. Clair College offers several programs. Here are few of the

Alternate questions (4)

Follow up prompts (3)

Use follow up prompts to connect question answer pairs for multi-turn conversation. This connection allows the client application to provide a top a needed. You can view all the connections to a question answer pair by selecting view context tree.

Add follow up prompt

- IT (Information Technology) & C...
- Management Programs
- Business

Metadata (1)

Context tree

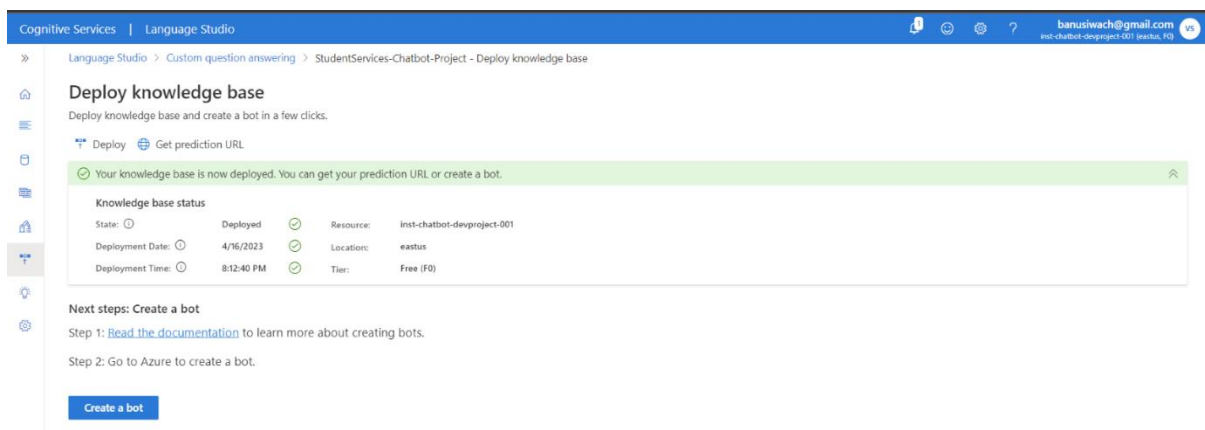
The context tree shows the connections between a question answer pair and any other question answer pair. Connections are made with follow up prompts.

Context tree

- International Student
 - IT (Information Technology) & ...
 - Computer Programming
 - Data Analytics for Busin...
 - Web Development and L...
 - Cyber Security
 - Management Programs
 - International Business M...
 - Event Management - B9...
 - Human Resources Mana...
 - Business
 - Business - B604
 - Business - Accounting - ...
 - Business - Marketing - B...
 - Data Analytics for Busin...
 - International Business M...

- The above screenshot illustrates the Context Tree generated from the Knowledge Base by adding follow-up prompts to the main header questions.
- The Context Tree displays the connections between question-answer pairs in a hierarchical format, making it easy for developers to identify all the possible answers to a given question.
- This format is an effective way to refine chatbot responses and improve the overall user experience.
- By analyzing the Context Tree, developers can gain insight into the logic behind the chatbot's responses and adjust accordingly.
- The Context Tree is a powerful Add-on for building and testing chatbots and is a critical component of any knowledge base.

Deploy Mode



- Once the testing is successful, the Knowledge Base can be deployed.

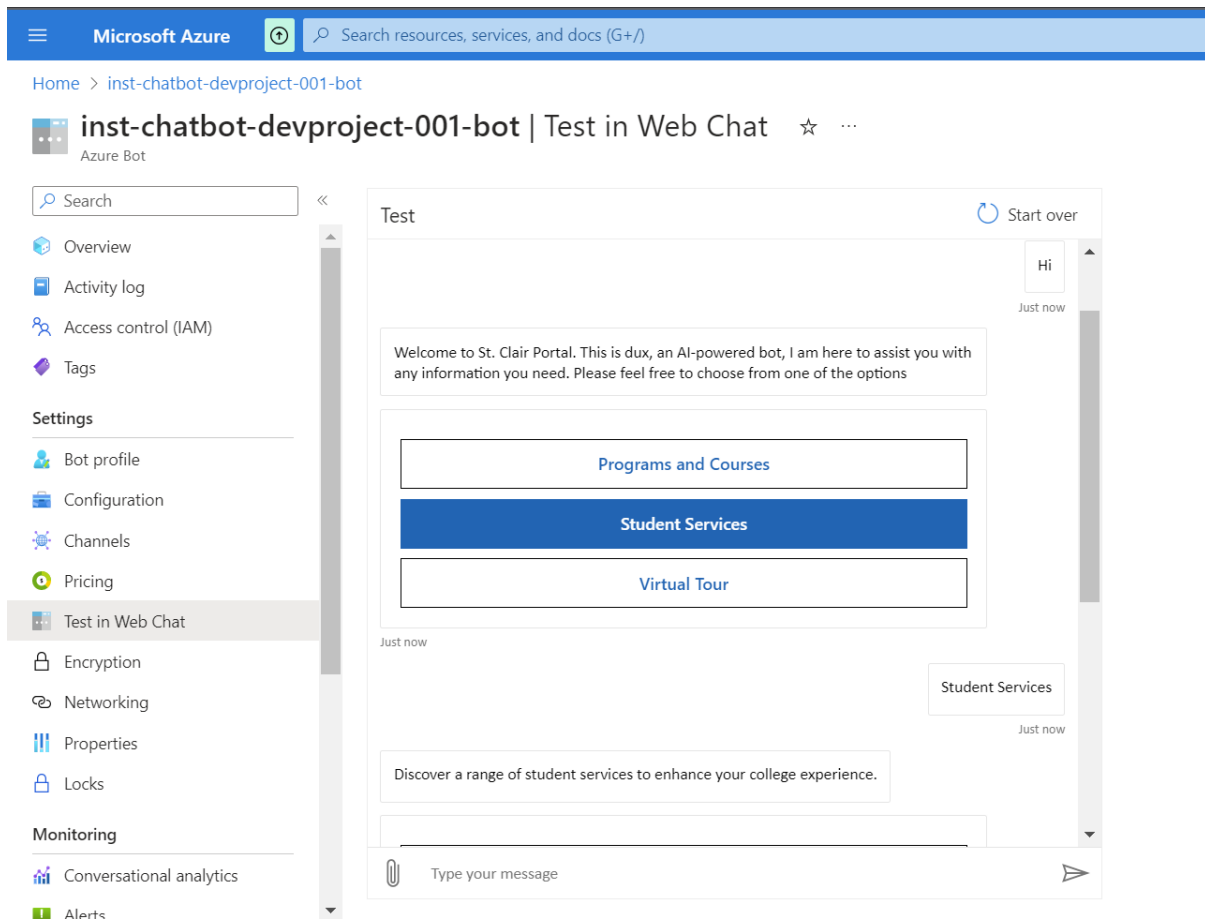
- Deploying the Knowledge Base enables the creation of a chatbot that uses the deployed version to answer user questions.
- The deployment process ensures that the chatbot is equipped with the latest version of the Knowledge Base and is ready to provide accurate and up-to-date responses.
- By deploying the Knowledge Base, developers can leverage the power of conversational AI to create a chatbot that provides intelligent and efficient communication with users.
- Deploying the Knowledge Base is a critical step in the chatbot development process, as it sets the foundation for a successful and effective chatbot.

Bot/All resources

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with 'Microsoft Azure', an 'Upgrade' button, a search bar, and user information. Below the navigation bar, the 'All resources' page is displayed. It includes a filter bar with options like 'Subscription equals all', 'Resource group equals all', 'Type equals all', and 'Location equals all'. There are also buttons for 'Create', 'Manage view', 'Refresh', 'Export to CSV', 'Open query', 'Assign tags', and 'Delete'. A table of resources is shown below the filter bar, with columns for Name, Type, Resource group, Location, and Subscription. Three resources are listed: 'inst-chatbot-devproject-001' (Azure Bot), 'inst-chatbot-devproject-001' (Language), and 'inst-chatbot-devproject-001' (Managed Identity).

Name	Type	Resource group	Location	Subscription
inst-chatbot-devproject-001	Azure Bot	rg-chatbot-devproject-001	Global	Azure subscription 1
inst-chatbot-devproject-001	Language	rg-chatbot-devproject-001	East US	Azure subscription 1
inst-chatbot-devproject-001	Managed Identity	rg-chatbot-devproject-001	East US	Azure subscription 1

Bot



- The above screenshot is an example of a deployed chatbot running in Web Chat mode.
- The chatbot is designed to answer student questions related to available courses at St. Clair College.
- With its intuitive interface and conversational AI, the chatbot will provide students with instant access to important information and assistance.

- By incorporating this chatbot into their platform, St. Clair College will be leveraging the power of AI to improve the student experience and streamline communication.

Conclusion:

With multiple training, Dux is now able to provide several information and courses to the students as it was planned. With a few simple steps, Dux can show any user:

1. List of different streams that college offers courses for
2. List of courses/programs
3. Program description, duration, fee structure, and website link
4. List of student services and their offering
5. 360 View Virtual Tour

Dux can be a suitable candidate for AI solutions for St Clair College and especially their website and be the perfect guide.

There are still some cases where Dux's knowledge lacks which, as mentioned earlier in the challenges, is because of too much-desegregated information available. Our team thinks with more structured data and training, our project and Dux can overcome the major challenges that we faced. With more training, Dux

will also be able to understand various ***slang*** and ***abbreviations***. We will also be able to embed other information regarding St Clair College like intake specifications, and other programs offered outside of Full-time like apprenticeships and SWAC. We can also embed this in the student's official portal ***BLACKBOARD*** to help guide current students in their study sessions and subject guidance.

As St. Clair College welcomes students from all over the world with various backgrounds and ethnicity, providing ***multilingual features*** in its chatbot can be another field of improvement for Dux that can be implemented in the near future. This will make it more convenient and accessible for each student and user.

Ethical Implications of AI

Artificial Intelligence(AI):

The advancement of science and technology has enabled humans to design machines that think and work like themselves. A computer program using AI can be described as a way of automating tasks and solving problems that are normally handled by humans. A computer program, using artificial intelligence tools, can now perform tasks that normally require the brainpower of a human, like visual perception, speech recognition, decision-making, and word translation.

IT, healthcare, aerospace, tourism, and the food industry all use AI in some form. In medical artificial intelligence, complex algorithms are used to examine, interpret, and even suggest solutions to complex problems.

Ethics in general:

In general, ethics represents a person's sense of what is right or wrong, good or bad, fair or unfair, compulsory or acceptable. It is primarily concerned with character as well as conduct. It discusses both governmental policy and more personal issues. Similarly, there is an expectation that the technology we make

will work for us rather than against us. IT is still being developed, controlled, and used in an ethical manner. Personal information should not be polluted or utilized for bad or harmful purposes. As technology advances, so must the ethics of that technology to protect persons and businesses who rely on it.

Ethical concerns related to AI:

There are various major ethical concerns related to AI explained below like **transparency**, **bias**, **accountability**, and **privacy** explained in detail below:

- Transparency:

Artificial Neural Networks (ANN) is a type of technology that we employ to operate the AI system that we design. The neuron functions mysteriously, like a mysterious black box. As a result, it may be difficult or even impossible to fully comprehend the machine's decision-making process. In some instances, it's possible that a machine can describe something, but a human wouldn't be able to comprehend it. Because we are not privy to the decision-making process behind an AI operation, it will always be difficult for the parties affected to accept such a result.

- Biases in AI:

AI cannot always be relied on to be impartial and fair. Human bias in the building of an AI system is at the heart of the bias problem, which is quickly becoming one of the most serious ethical issues in AI. Bias has already been discovered in fields ranging from criminal punishment to photograph captioning. These biases are more than just embarrassing for the corporations that manufacture these defective products; they have tangible negative and harmful effects on the people who are the victims of these biases, as well as reducing trust in corporations, governments, and other institutions that may use these biased products. Take for example, how the AI algorithms used in facial recognition systems have a hard time identifying dark-complexioned people compared to the fair-skinned public, especially in the United States. (*Facial recognition is accurate, if you're a white guy (Published 2018)*. (2018, February 11). The New York Times - Breaking News, US News, World News and Videos.)

- Accountability:

In the field of AI, we frequently encounter other ethical dilemmas like this one. Since there are many steps involved in creating a system, from designing the architecture to manufacturing it, it is frequently impossible to

hold the individual or organization responsible when an AI system they created performs in an unexpectedly poor way. Consider, for instance, the case of AI committing unjustified discrimination. This can result from skewed training data, flawed systems, programmer mistakes, misuses, or the replication of social discrimination, and occasionally from a combination of these factors. Assessing accountability for such outcomes presents difficulties because of the nature of AIs. This is due to the fact that individual roles in systems with various actors and resources are tough to pin down as a result of the opaque and unexpected results of AIs.

- *Privacy & Security:*

For an AI system to be taught correctly and function as intended, a large number of datasets are required. These datasets, which are frequently real-time, may contain personal information about different consumers, including name, address, security number, bank information, etc. If these data are made public, there is a danger that they will be misused by different parties. If these data are used improperly or are not safeguarded, there may be catastrophic consequences depending on how the AI is employed. The first things that come to mind for the public, aside from

defence, national commerce, and other similarly sensitive areas, are healthcare and pharmaceuticals, banks, schools, and educational institutions.

Ethical Implications of using AI in Finance Sector:

No one can dispute the fact that Artificial Intelligence (AI) technology has many benefits, which is why it has been making inroads into the financial services industry for some time. Fraud detection, risk management, credit scoring, and wealth advisory are just a few of the areas where AI is currently supporting or even replacing human decision-makers. AI has the ability to boost output, simplify processes, reduce costs, and enhance the customer experience. Potential applications also include customer support, marketing, portfolio management, treasury, and securities trading. In some circumstances, it may even be claimed, it would be harmful to not use AI. The expanding volume of data that needs to be processed makes artificial intelligence systems necessary. AI will be widely used in finance if technological advancements, data availability, and competitive pressures persist.

The adoption of AI does, however, present its own unique set of difficulties, as with any new technology. These concerns, which cover a wide range of topics

from algorithmic bias and data privacy to job displacement and the need for regulation, underline the importance of taking an accountable and responsible approach to the development and use of AI. The main branches of AI ethical issues in finance are thus grouped under **'bias'** and **'transparency'** as raised by regulators, clients, and finance specialists.

To develop ethical standards and best practises, governments, regulatory agencies, and businesses must work together to address the ethical implications of AI in finance and other industries. If these problems are not addressed, both the individual and the society may suffer. As a result, it is crucial to give top priority to creating a thorough plan for the ethical deployment of AI in banking and other sectors while weighing the possible advantages against ethical concerns.

- AI Bias in the Financial Sector-

When an AI model makes judgements that can be construed as prejudiced against demographic groups, the behaviour is considered bias. One would believe that these are unusual events because machines ought to be less "judgmental" than people. Sadly, they are much more common. Even some of the most powerful corporations in the world can experience AI failures.

Incorrect framing of the issue is one factor contributing to algorithms going rogue. For instance, if an AI system tasked with determining a customer's creditworthiness is told to maximize profits, it may soon engage in predatory behaviour and search for people with poor credit ratings to sell subprime loans. Although society may view this practice as unethical and distasteful, AI is insensitive to such subtleties and nuances.

Bias is more frequently introduced into lending models when selecting the information or weightings that the algorithm will use to decide whether to approve an applicant. When utilizing manual scorecards or linear regression models to make judgments about a borrower's creditworthiness, lenders are aware of the data items they should avoid employing, including:

- The candidate's race or ethnic origins
- Applicants' gender or sexuality.
- Age of the candidate

As further restrictions are established in the upcoming years, there will surely be additional data pieces that are prohibited from usage in credit modelling. Other factors, such as property values, can act as unambiguous proxies for race.

A biased algorithm can have a variety of negative effects, but in credit modelling, they can be detrimental to people who are already at a disadvantage when trying to get credit. People of color are already much more likely than whites to have their mortgage applications refused, in part because normal credit ratings do not take into consideration recurring expenses like rent, phone bills, and utility bills. People of color may have weak credit histories, but they are equally likely to repay loans as white consumers with strong credit histories. This is how the credit system is currently set up; if lenders and regulators are unable to examine an algorithm and determine how it arrives at its judgments, machine learning may make the situation worse. Because the system is already biased and opinionated because of the data being fed into it, unintentional bias may also occur from a lack of social awareness. The machine only tries to optimize the model for the inefficiencies in the system because it neither understands nor can consider eliminating these presumptions.

Finally, the data themselves could not be a good representative sample. The algorithms may draw broad conclusions based on the scant information they have if there are low sample sizes from minority segments and some of these

data points turn out to be problematic. This is like every other human decision that has been influenced by availability heuristics.

The issue of who is accountable if AI makes a poor decision is another difficulty regarding its use. The idea of algorithmic accountability should be used, with its main principle being that the algorithm's operators should implement enough controls to ensure the algorithm functions as intended.

- AI Transparency in Financial Sector-

Many algorithms suffer from a lack of transparency and interpretability, which makes it challenging to understand how and why they arrive at results. This is a problem that is frequently raised in relation to AI. Therefore, it may be difficult to spot model bias or discriminatory behaviour. The two issues mentioned above are fundamentally caused by the absence of openness and the popularity of "black box" models, it is reasonable to argue. Black box AI is an example of a transparency issue where the model loses the ability to explain an algorithm's output and insights. It is one of the main issues of transparency in AI and a popular one.

Lenders must be able to articulate the reasons why credit applicants were turned down while doing credit underwriting. Because they include considerably

fewer factors than a machine learning model, traditional linear models make this relatively simple because it is simple to understand how the model and the underwriter arrived at the borrower's choice. A machine learning-based credit decision may involve hundreds of variables.

Without thorough explaining ability, lenders are unable to give applicants an adverse action notice that explains why they were turned down; this information can be used by applicants to enhance their credit profiles and successfully apply for loans in the future.

The employment of mysterious machine learning-based credit models by lenders may result in severe legal repercussions. Lenders must be able to describe the models they use to accept or reject credit applications in accordance with the Fair Credit Reporting Act of 1970. Large fines and/or the suspension of a banking license may occur for failing to do it accurately. Lenders have been hesitant to use machine learning for credit scoring and underwriting for several reasons, but non-compliance is perhaps the most important one.

Recommendations for designing ethical AI systems:

For the AI system to adhere to ethical standards, it is necessary to mitigate several ethical challenges, including transparency, bias, accountability, and privacy. To do that, we can follow the below procedures.

- *Making the system transparent:*

When we argue that AI requires openness, we don't always mean that the system's underlying codes and algorithms must be made publicly available. Instead, the focus is on how the organization employing the AI model for decision-making can communicate the outcome to the parties in question based on several variables that the organization has established as key criteria. When the pertinent agent has the necessary information to comprehend how the system operates, an AI system can be said to meet transparency. By describing the factors that contributed to a specific result and perhaps how a different output would be generated in the case of a non-technical end user, an acceptable level of transparency can be attained. Consider a scenario where a business uses AI to turn down an applicant, and the applicant asks to know the reasons why. It is crucial to consider whether the model is understandable to the relevant party, in this

case, the applicant, when determining whether the company's AI tool is transparent. In order to become transparent, organizations should implement appropriate, purpose-built tools that provide contextual information about the quality of the data the model is trained on, the changes in the model, the values of attributes and how they change over time, and the root causes of problems it encounters.

- Removing biases:

The quality of the dataset used to train the model is the primary cause of the system's biased judgments. The level of bias in the output can be reduced by employing data that incorporates varied groups of people from different origins and ethnicities because machine learning models are created by people and trained on socially generated data. Before feeding the training data to the AI, the training data needs to be handled with extreme caution and constant scrutiny to look for potential bias. Second, we should examine the statistical validity of the model's results, determine whether any particular groups are underrepresented, and, if necessary, make adjustments to the model to address the issue. Another method is to fully comprehend the issue stated that the technology is intended to

address. A good understanding of the issue will make it easier to create a perfect system that can provide accurate results in real-time for various dataset kinds without bias.

- *Setting up Accountable policies:*

All organizations using AI technology need to establish strict policies to hold each other accountable for any wrongdoings. It is important to establish a hierarchical accountability level so that the responsible parties can be held accountable for any actions taken by an AI system that falls short of the desired outcome. This ensures that the application complies with all applicable laws and moral principles. Examining data, gathering proof, and assessing system behaviour are also helpful. Another approach would be to assign separate users the tasks of designing, developing, and deploying AI systems so that each one could be identified and held accountable for their actions. If compliance is the primary objective of accountability, the focus of regulation should be on the responsibilities of designers and developers to create AIs that adhere to ethical, legal, and technical norms. In contrast, if a report is given priority, the emphasis is on the need for information exchange or openness, such as data sources, metrics, or procedures.

- *Strong Data Privacy and Security Protocols:*

An ethical AI system will have strict data privacy policies in place to guard against data breaches at any time. Only the exact data types required for the AI should be collected, and the data should be retained securely and only for as long as is required to achieve the goal. Users should be informed when their personal data is being utilized and when AI is being used to make choices about them. This is especially important when using personal data. For any organization using user data to train its AI models, disconnecting data from users through anonymization and aggregation is essential. The AI system should be developed with privacy protection as a top concern, and the developer should look for appropriate security reinforcement measures. By evaluating methods of getting and utilizing crucial information from third parties, you can protect consumers' autonomy and privacy. Examine all potential sources of data carefully, and only utilize those that have explicit, informed user consent.

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