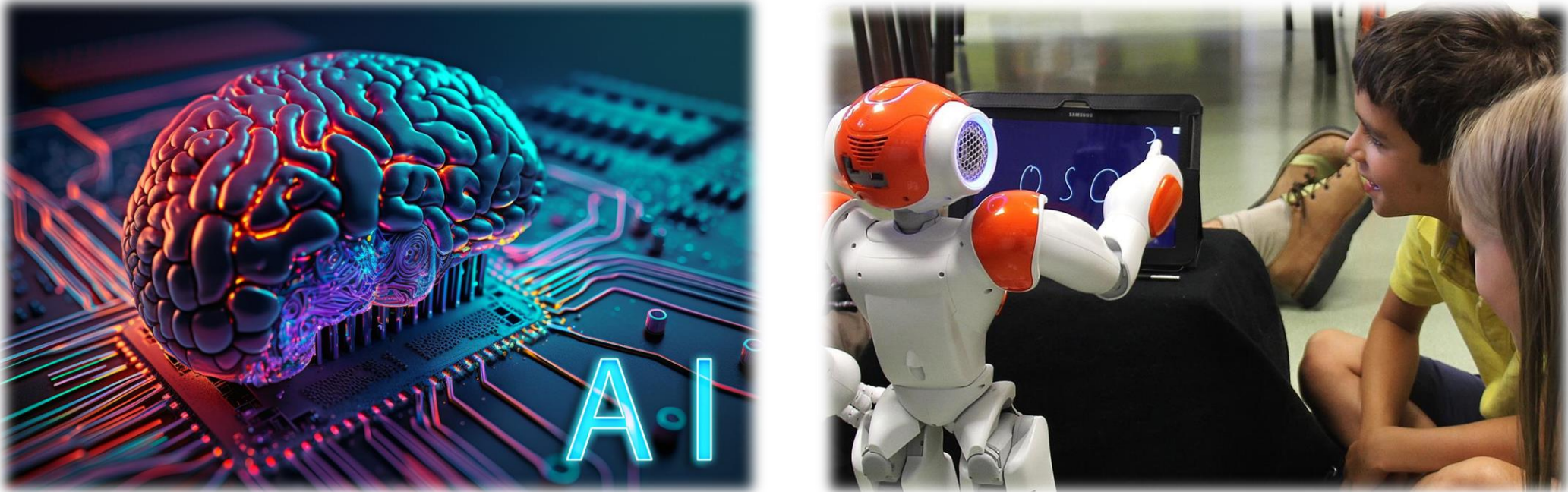


Introduction

Two years ago, in sixth grade, one of my friends struggled to turn on a computer in our school's media center. A staff member scolded him harshly for pressing the printer button multiple times, making him feel badly about his skills. This incident inspired me to imagine an AI-powered 'Wise Student' that could support students like my friend in that moment of need. I thought to myself, “What if there was a wise student amongst us who is knowledgeable about the tasks that we encounter from day to day, and always available for that quick question or advice, this would likely have alleviated the problem in that moment, which made my friend feel badly? Luckily, with new advancements in AI, this would be possible, and herein, I'm developing this smart, AI-assisted student. I’m hoping that this AI-assisted Student Helper can start to help students all around the world with anything they are facing in school at the moment.

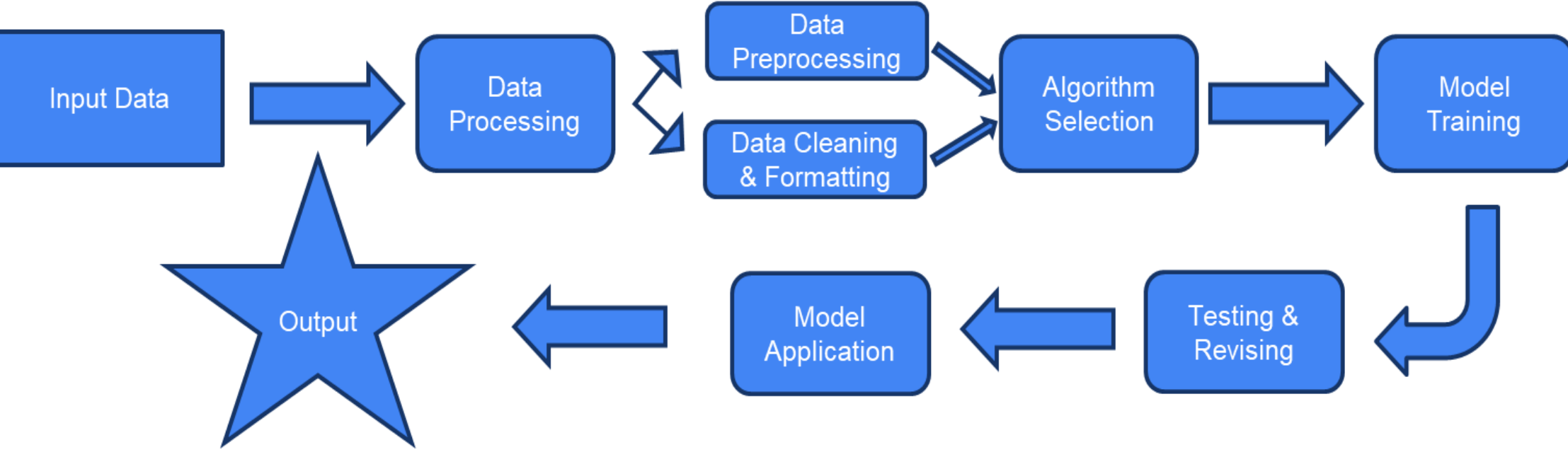


What is AI? & How Does AI Work?

AI is utilized across various domains, including education, healthcare, finance, and entertainment, to automate tasks, gain insights from data, and enhance decision-making processes. In education, AI can play a crucial role in personalized learning experiences, adaptive tutoring systems, and student assessment. By analyzing vast amounts of data, AI can identify patterns in student performance and tailor educational content to meet individual needs. Additionally, AI-powered tools like chatbots and virtual assistants provide instant support to students, answering questions and offering guidance outside the classroom. Moreover, AI algorithms can be employed in grading assignments and assessments, and even providing timely feedback to both students and teachers.



At its core, AI operates through complex algorithms and models inspired by the structure and function of the human brain. Machine learning, a subset of AI, involves training algorithms on large datasets to recognize patterns and make predictions without being explicitly programmed. Deep learning, a more advanced form of machine learning, utilizes neural networks with multiple layers to extract hierarchical representations of data. These models learn from examples, iteratively improving their performance over time through a process known as training. By harnessing the power of AI, organizations can automate repetitive tasks, optimize processes, and unlock valuable insights from vast amounts of data, ultimately driving innovation and efficiency across various industries.



Research Goal

The goal of this research is to make a Chatbot that utilizes Generative AI and data given from counselor at my school. I want to make this because the student to counselor ratio is somewhat absurd, as in 1 counselor for the entire 8th grade student body. I also want this Chatbot to be able to help students 24/7 with any problems or questions they have. For example, “Who should I talk to if I’m getting bullied by some one at my school?” The AI program will then give an answer along the lines of: “If you are getting bullied, you can contact a counselor at your school using this number {123- 456-789} or this email address {conselour@something.com}.” I am hoping that this program will be able to give 24/7 support to all students and when ever they need it almost like First Aid but for students.

Automating Student-Parent-School Support Logistics via Generative Artificial Intelligence

Hypothesis

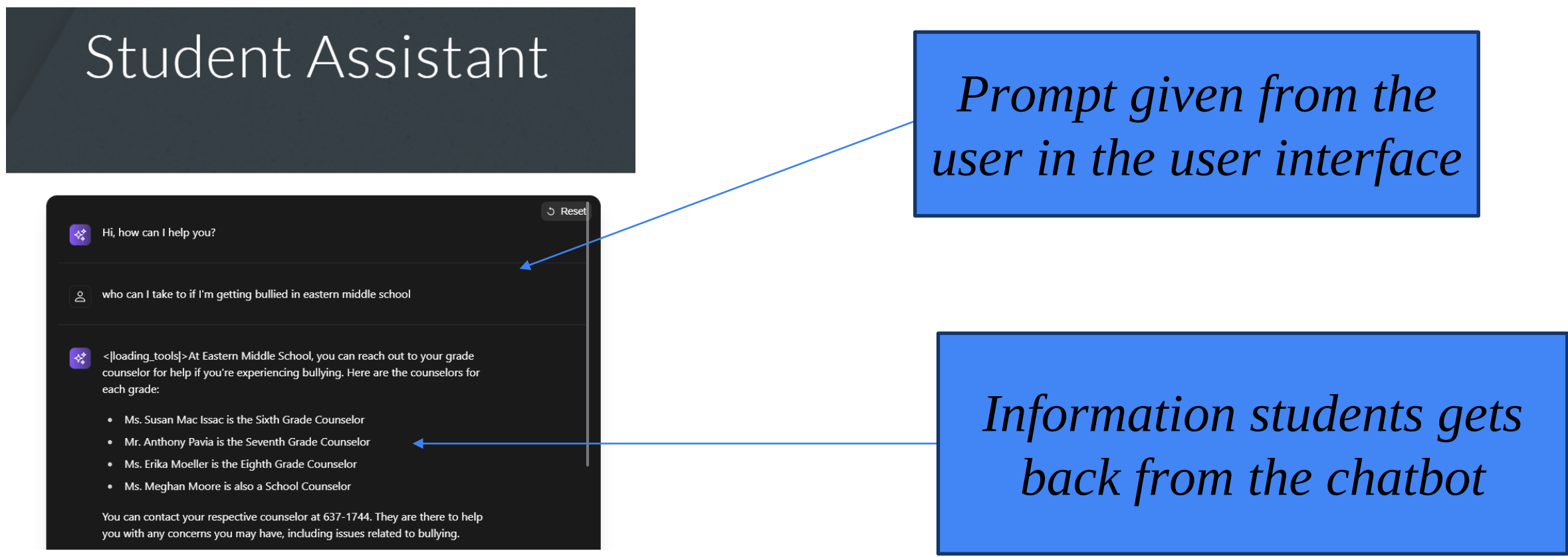
The purpose of AI-Driven Student Support Services is to enhance traditional support systems by leveraging modern AI technology. This approach presents several benefits including,

- Broader reach addressing diverse student needs and 24/7 availability
- Can be extended to different schools very easily
- Reduced cost

Additionally, the implementation of AI-Driven Student Support Services leads to improved outcomes, increased access to support, and enhanced efficiency compared to traditional systems. The hypothesis is that the implementation of an AI-driven student support system will contribute to a more effective, inclusive, and cost-efficient student educational environment. This will complement traditional human based counseling.

How is AI Utilized in this Project?

AI is utilized in this project in many ways. Firstly, the Machine Learning program learns and analyzes the data and stores it in a database. Using the database, the Generative Part of the program uses this data and then understands what the User is asking using a Large Language Model (LLM) which can evaluate what the user is saying. Then using that data and the understanding of the prompt, the AI program will then use the LLM to give a response back to the user.

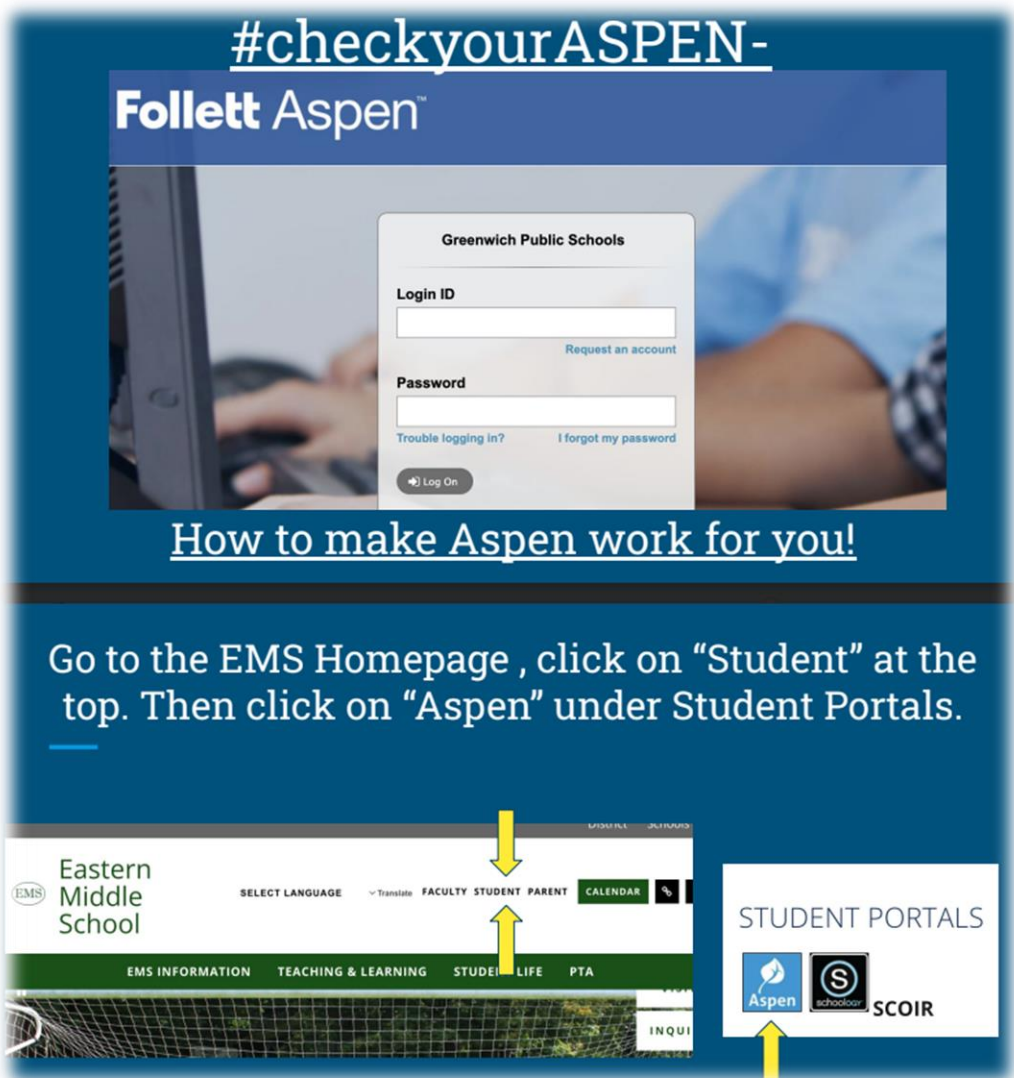


How Program will look like:

Data Collection

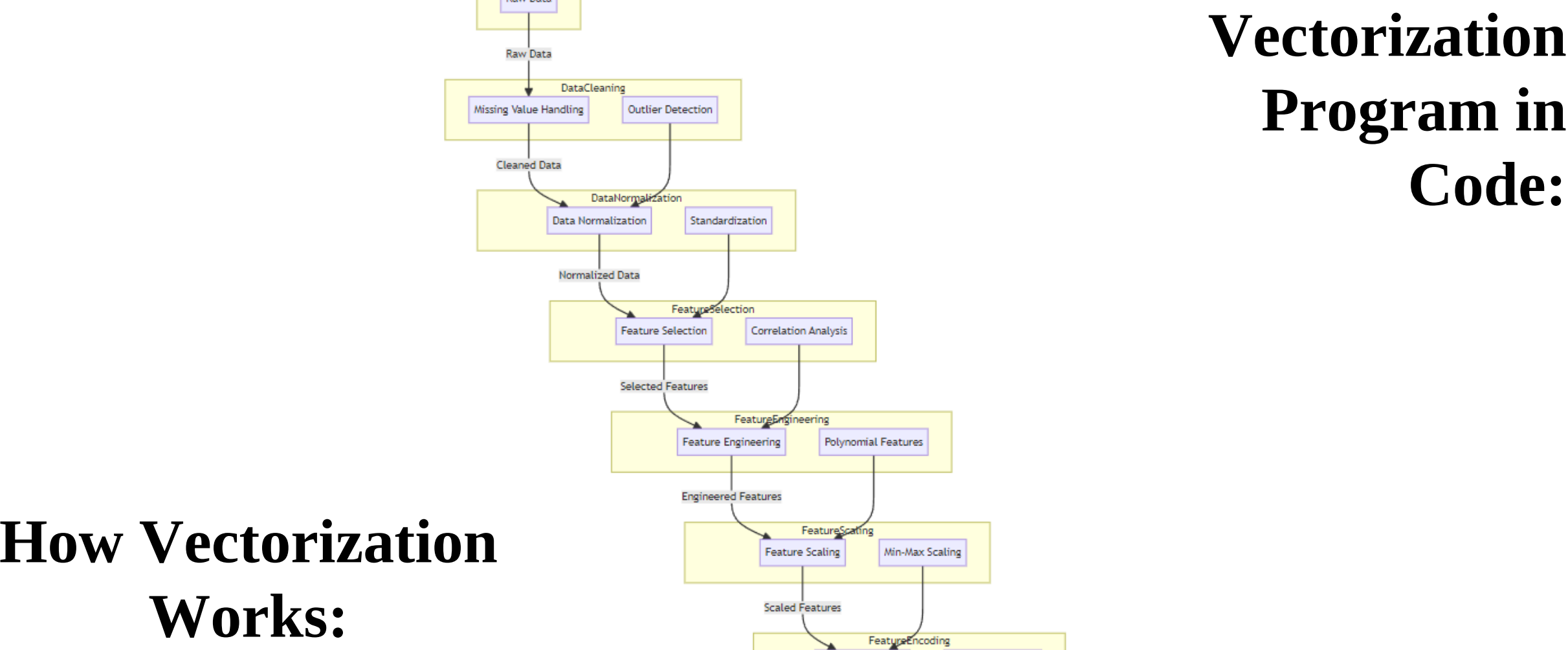
To get accurate and important information for my program, I contacted my school counselor. I asked for information like common FAQ’s from transitioning from 5th grade to 6th grade or transitioning from 8th grade to 9th grade, how to deal with problems like “How does Aspen work?” or “How does the pattern schedule work at Eastern Middle School?” I also asked for any documents and PDF’s counselors had used in the past for helping students with any problems they had in the past. Using this newfound data, I implemented this data into my program for more specific results to my school.

Type of Data Inputted



Data Utilization

I used this data in many ways in my program. Firstly, I trained the AI using the data given from the counselor. The data was first vectorized into smaller chunks so that the AI program can map each vector a name. The AI began the tedious process of analyzes all the vectors of the data. After the vectorization and analyzation, the AI program using the mapping of the vectorized chunks and gives them “names” about what each chunk contains. After this, the users prompts can be answered using the previous data in the AI and the counselor data.



```
app.get('/search-and-summarize', async (req, res) => {
  try {
    // Load and split PDF document
    const loader = new PDFLoader("doc.pdf");
    const data = await loader.load();
    const textSplitter = new RecursiveCharacterTextSplitter({
      chunkSize: 200,
      chunkOverlap: 20,
    });
    const docs = await textSplitter.splitDocuments(data);

    // Connect to MongoDB and setup collection
    const client = new MongoClient(process.env.ATLAS_CONNECTION_STRING);
    await client.connect();
    const database = client.db("svsu");
    const collection = database.collection("test");
    const dbConfig = {
      collection: collection,
      indexName: "vector_index",
      textKey: "text",
      embeddingKey: "embedding",
    };
    const { searchQuery } = req.query.text;

    const vectorStore = await MongoDBAtlasVectorSearch.fromDocuments(docs, new OpenAIEmbedding(), dbConfig);
    const results = await vectorStore.maxMarginalRelevanceSearch(searchQuery, {
      k: 3,
      fetchK: 10,
    });

    // Extract text from results for summarization
    const textsForSummarization = results.map(result => result.pageContent).join('\n');
    console.log(results);

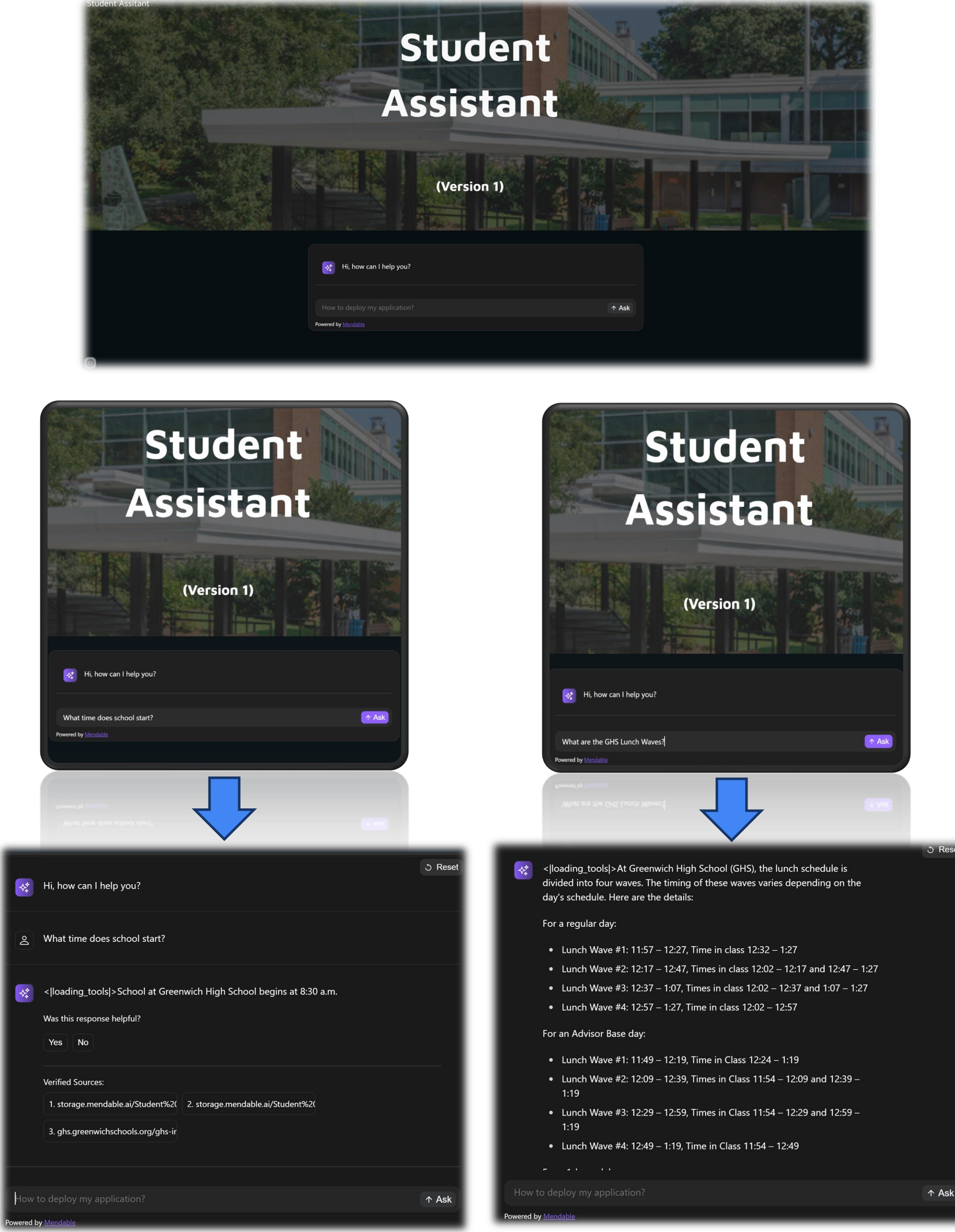
    const completion = await openai.chat.completions.create({
      messages: [{ role: "system", content: textsForSummarization }],
      model: "gpt-4",
    });

    // Send the summarization result as a response
    console.log(completion.choices[0].message.content);
    res.json({ summary: completion.choices[0].message.content });
    // Close the MongoDB connection
    await client.close();
  } catch (error) {
    console.error("Error:", error);
    res.status(500).send("An error occurred while processing your request.");
  }
});
```

Methodology

1. Collect and prepare relevant data
Note: schools often collect data such as, student surveys, attendance & discipline records, academic performance/grades, human counseling and support services data, social media or online interactions.
2. Process data to extract features which are crucial for finding insights.
3. Extract Engineer meaningful features for the model.
4. Create a Model, validate and refine the model's performance.
Note: As a first step, I wanted to start with an existing open-source AI models (Stanford CoreNLP, Hugging Face Transformers) to validate the concept first before going through the labor of constructing my own model and to save cost.
5. Train and Integrate the model into the support system infrastructure.
6. Deploy and a user-friendly interface for Students access
7. Test the system thoroughly and gather user feedback.
8. Continuously improve and update the model based on feedback

Use of the Application



Conclusions

The execution of this project went well, as I successfully managed to create a program that could be access from anywhere from the internet, and it can be accessed 24/7. This AI program is also giving accurate information and responses back to the user. The AI program will also help the user if they problems like “ How can I get homework done faster?” or “How does Aspen work?”.

Future Research

Future Research into this program would involve my scaling the program to more schools and create more specific results per school, so I can help more students like my friend. I am also hoping that this program will increase productivity and morale in more schools.