Meet Jane

- Suffering from headache
- Does not have time for long doctor’s wait room times
- Overwhelmed by information on the Internet

AI Chatbot: Personalizing Digital Health Advice

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Agenda

- Problem Statement
- Proposed Solution
- Benefits
- Data Sources
- Implementation
- Measuring Impact
- Business Case
- Competitive Analysis
- Ethical Considerations
- Future Research
- Q&A

Example

- In 2013, over **50%** of Canadians **used Google for self-diagnosis**, while in 2020, **69% searched online** for health information, and **25% used online resources** for health tracking.
- A significant percentage of American adults, between **67.5% and 81.5%, search for health-related information** online during these years.

The Problem

Increasing reliance on online health advice causing more harm than good.

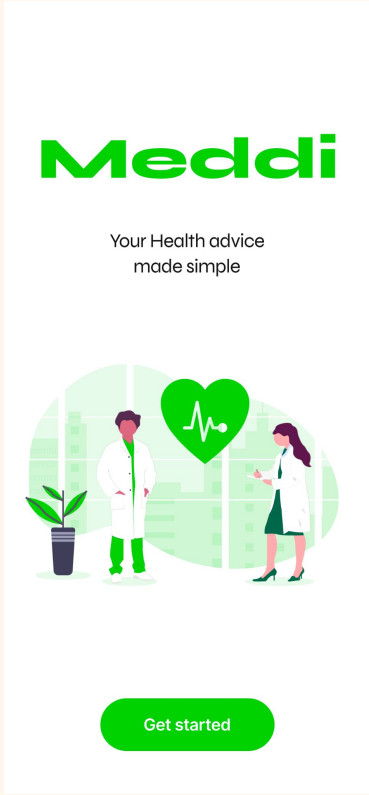
- **Trustworthiness issues** in AI chatbots providing health advice
- **Inaccurate self-diagnosis** based on online information leading to **anxiety** and potentially **harmful decisions**
- Survey results: **43%** Americans **misdiagnosed themselves** after researching symptoms online
- **74%** reported that the results **increased their worry**

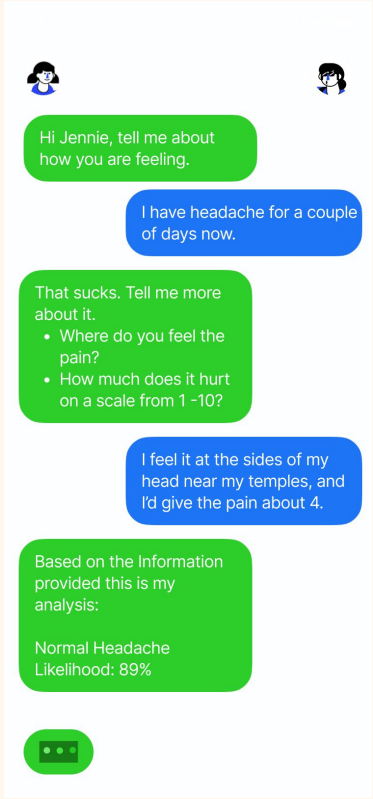
Our Solution: Meddi

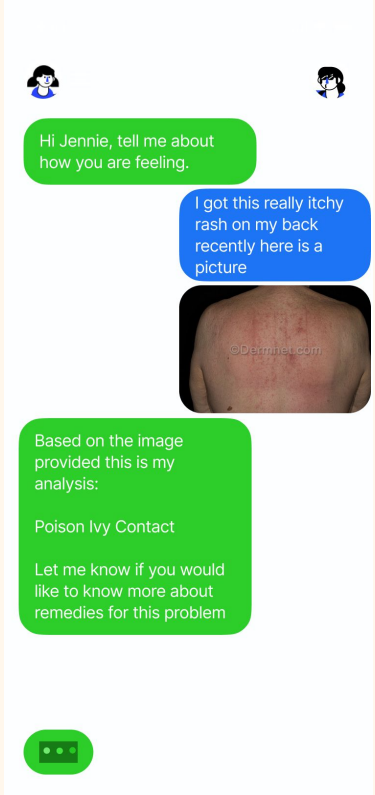
An AI chatbot that refrains from generalized and unspecified diagnosis

- The chatbot engages in a conversational manner, asking about symptom severity and related signs for more accurate results.
- Accepts and responds to bimodal input (text, and images)
- It provides multiple potential diagnoses with corresponding severity and likelihood indicators.

Meddi Demo


Meddi
Your Health advice made simple
Get started


Hi Jennie, tell me about how you are feeling.
I have headache for a couple of days now.
That sucks. Tell me more about it.
• Where do you feel the pain?
• How much does it hurt on a scale from 1 -10?
I feel it at the sides of my head near my temples, and I'd give the pain about 4.
Based on the Information provided this is my analysis:
Normal Headache
Likelihood: 89%


Hi Jennie, tell me about how you are feeling.
I got this really itchy rash on my back recently here is a picture
Based on the image provided this is my analysis:
Poison Ivy Contact
Let me know if you would like to know more about remedies for this problem

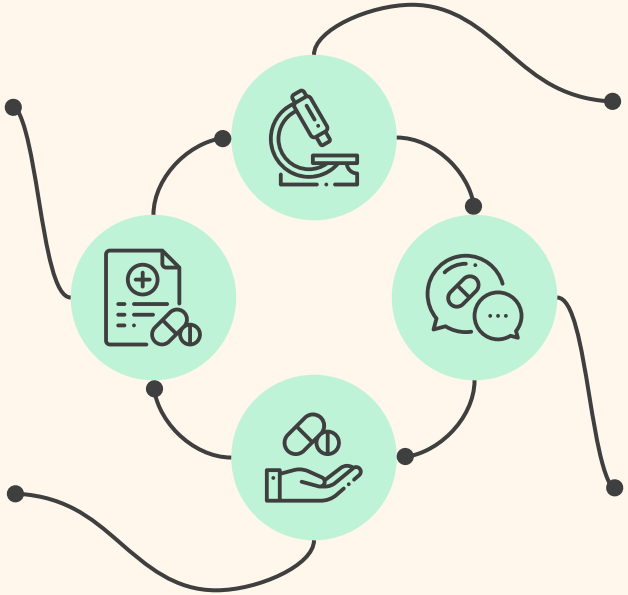
Meddi Benefits

Chatbot will be online 24/7

24/7 Availability

Strict privacy protocols to ensure maximum confidentiality

Ensures Privacy



Easily Accessible

Built with Microsoft Azure services

Well-rounded

In most areas regarding healthcare through thousands of databases.

Risk of Misdiagnosis

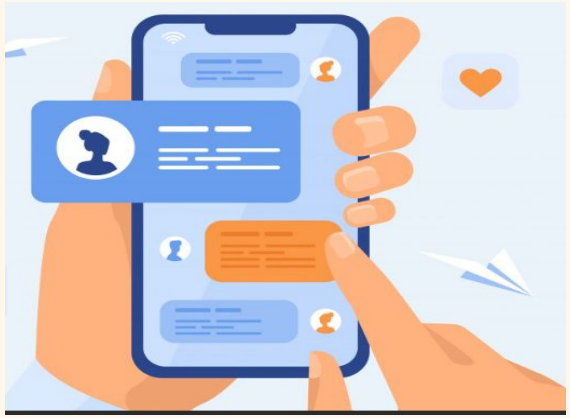
- Overconfidence in self-diagnosis, leading to disbelief in professional opinions.
- Unnecessary panic due to inaccurate worst-case scenario assumptions.
- Requesting unnecessary tests, wasting time and money.
- Reliance on unreliable sources with misleading information.

Data Sources

- Symptom Databases (National Library of Medicine)
- Drug Databases (Kaggle)
- Public Health Databases (PubMed)
- Medical Research Papers
- Healthcare Surveys and Questionnaires (Statistic Canada)

Implementation (Data Processing)

Data collection: refers to the systematic collection of relevant patient information, medical data and other healthcare-related data from a variety of sources



Text/Voice

Image

Implementation (Training Model)

Technologies and Services:

- Azure Computer Vision
- Azure Language Understanding Intelligent Service (LUIS)
- Text Analytics (Sentiment Analysis, Key Phrase Extraction)
- Azure Machine Learning

Models:

- Image classification model
- Regression Model

Testing:

- Holdout Method

Implementation (Deploying & Monitoring)

1. Create user-friendly interface (website)
2. Add AI interface to it
3. Publish public website
4. Maintain Site
5. Anonymously use data from users to retrain model

Measuring Impact

Positive Impacts on Society:

- Bridges healthcare accessibility gaps
- More personalized healthcare solutions
- Contribute to early disease detection
- Promote health awareness and education

Measuring Impact:

- User satisfaction surveys
- Tracking patient outcomes
- Measuring healthcare system changes

Measuring Impact

Mitigating Negative Impacts:

- Following ethical and privacy guidelines
- Develop with diverse datasets
- Regular monitoring and updates
- Implement strong security measures
- Adopt sustainable technology practices

Cost Calculation

23%

Storage

Storage Accounts, SQL Databases etc.

60%

AI Services

Azure AI Bot Service, Machine Learning etc.

17%

Development and Deployment

Azure DevOps, Web Static Pages

Total Cost: $2,114.91*

*based on Azure Cost Calculator

Business Case

Meddi Pal (Health Journal):

- Target: Health Enthusiasts
- Logs user data to improve accuracy
- Connects to third party api (My Fitness Pal, Apple Health etc.)
- Prompts user to update their health and wellness regularly

Cost: $10/Month

Meddi Pro (Enterprise):

- Target: Doctors, Nutritionists, Coaches
- Allows professionals to manage multiple accounts and track their health progress
- Users can choose what data to share

Cost: TBD

Competitive Analysis

Current Solutions	Limitations	Meddi
Google Search	Generalized insights	Responses tailored to individuals inputs
	Advertisements	No Advertisements
Chat GPT	Risk of hallucinations	Doesn't use transformer model
	Not specialized for healthcare	Made solely for health queries
Med-PaLM	Has a bias in data	Trained with a variety of data sets to reduce bias
	No platform	Web and app platform

Ethical Considerations

- Maintain user anonymity
- Have strict confidentiality protocols
- Require explicit user consent
- Provide disclaimers for services
- Regular audits & Human oversight

Future Research

- Enhance prediction accuracy through research
- Study chatbot impact on patient confidence
- Invest in advanced NLP techniques for personalized, human-like responses
- Develop AI-specific healthcare legal and regulatory frameworks, ensuring ethical deployment and data privacy

Thank You!

Any further questions?

Sources

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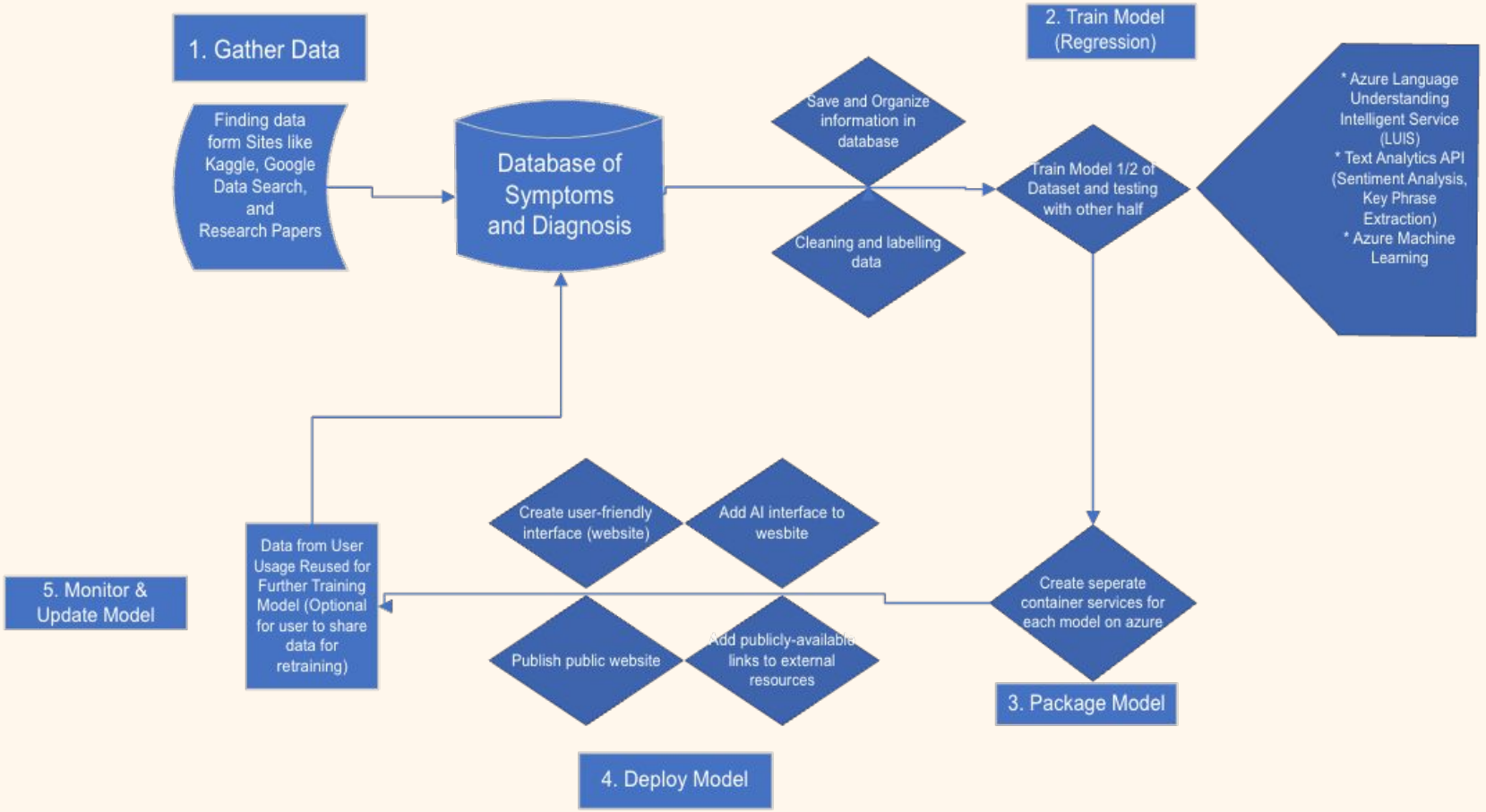
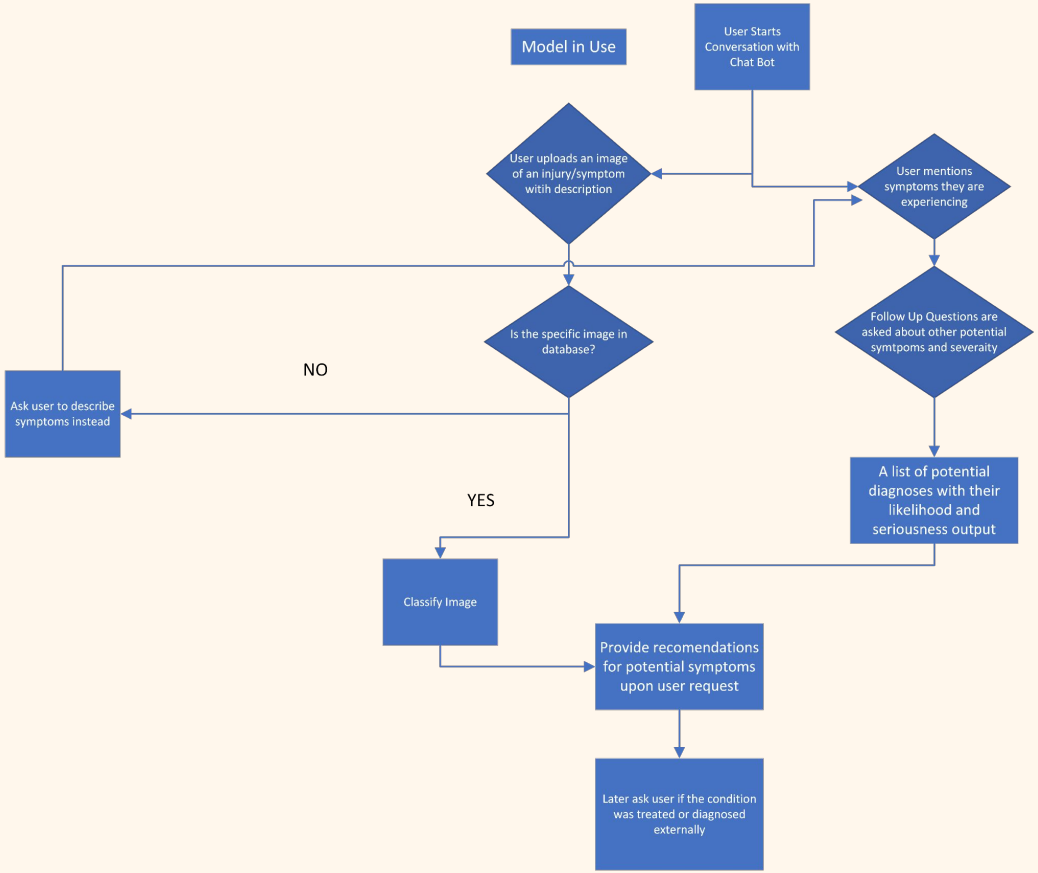
Appendix

- Pipeline Training Sequence
- Model in Use Pipeline Sequence
- Detailed Cost Breakdown
- Data Set Examples
- Azure Responsible AI Principles

Training Pipeline Sequence



Model in Use Pipeline Sequence



Detailed Cost Breakdown

Service category	Service type	Estimated monthly cost
Analytics	Azure AI Bot Service	$0.00
Analytics	Azure Machine Learning	$334.34
Web	Azure Cognitive Search	$173.04
Storage	Storage Accounts	$52.41
Databases	Azure SQL Database	$372.97
Storage	Storage Accounts	$52.41
Compute	App Service	$54.75
AI + machine learning	Azure OpenAI Service	$60.00
AI + machine learning	Azure AI services	$700.00
Developer tools	Azure DevOps	$260.00
Web	Static Web Apps	$55.00
		$2,114.91

Data Set Examples

Symptom Correlations Data:

Lifestyle and Demographics affect on Heart Disease (4,500+ results)

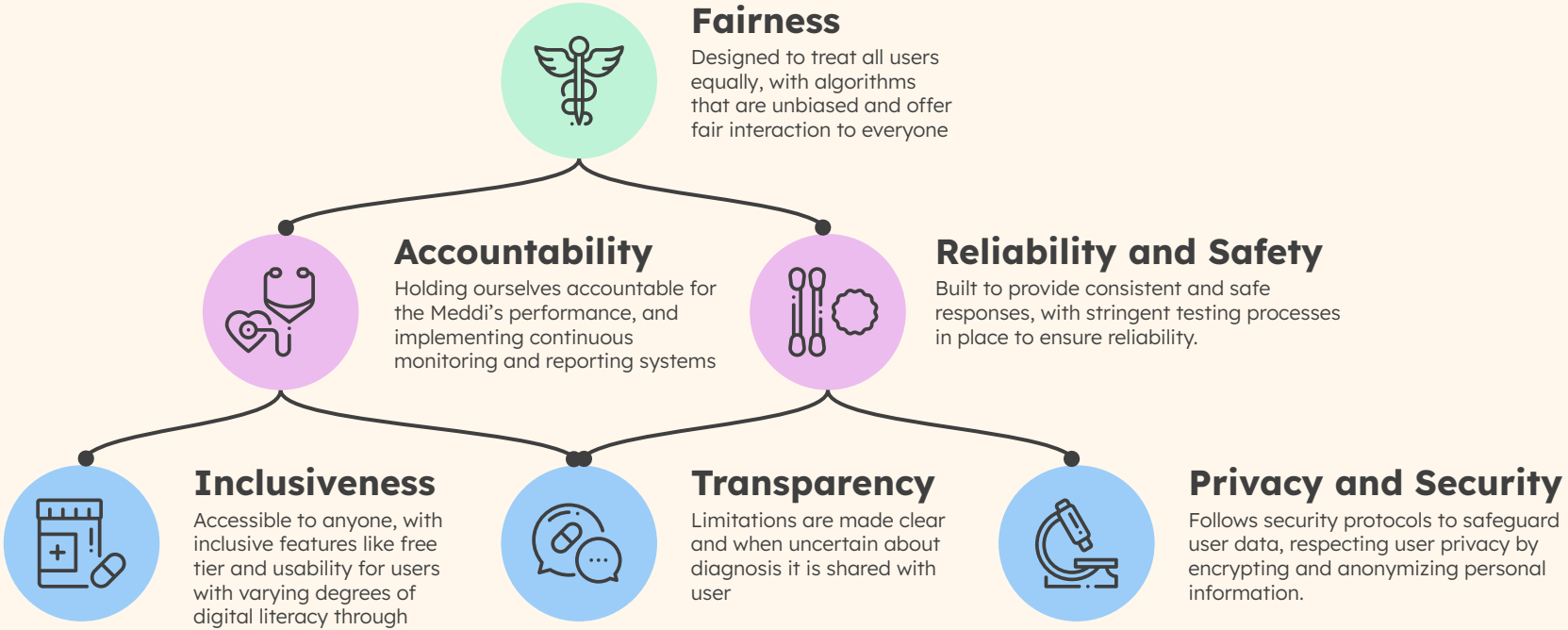
Research Paper on Migraines and Triggers

Image Data Sets:

Skin Diseases Data Set (23 Diseases, 19,000+ images)

Chest X-Ray Data Set (Tests Pneumonia, 5,800+ images)

Azure Responsible AI Principles



Fairness

Designed to treat all users equally, with algorithms that are unbiased and offer fair interaction to everyone

Accountability

Holding ourselves accountable for the Meddi's performance, and implementing continuous monitoring and reporting systems

Reliability and Safety

Built to provide consistent and safe responses, with stringent testing processes in place to ensure reliability.

Inclusiveness

Accessible to anyone, with inclusive features like free tier and usability for users with varying degrees of digital literacy through simple interface

Transparency

Limitations are made clear and when uncertain about diagnosis it is shared with user

Privacy and Security

Follows security protocols to safeguard user data, respecting user privacy by encrypting and anonymizing personal information.