Existing Market Solutions

01. IBM Watson for Health
02. Epic Systems' Clinical Decision Support (CDS)
03. Teladoc
04. WebMD Symptom Checker
05. ADA Health Mobile App

Medquest: Technology at your service

Asclepius LLM

User assessment

Classification Neural Network
LLM - Foundational Model

State-of-the-art Large Language Model

Asclepius 13B

Contains Medical knowledge and ethical considerations

Clinical Notes

Double purpose:

- It is the first level assessment
- Self care recommendation tool.

(*) [2309.00237] Publicly Shareable Clinical Large Language Model Built on Synthetic Clinical Notes (arxiv.org)
Classification Dataset

**Disease-Symptom** Dataset licensed by The World Bank

- 246,000 samples
- 772 unique diseases
- 377 unique symptoms
- Source: [Kaggle](https://www.kaggle.com)

*Occurrence Possibility Preserved to Reflect Real World*
Dataset Manipulation

Diseases Distribution

Threshold: Top 57%

Symptoms per Disease Distribution

Threshold: 4 symptoms

Frequency

Symptom Count
Symptoms & Diseases EDA

Diseases in Cluster 0
- Substance use
- Anxiety
- Delusions
- Depression
- Developmental disability

Diseases in Cluster 8
- Fungal infection of the hair
- Eczema
- Skin pigmentation disorder
- Skin polyp
- Seborrheic keratosis
# Classification Evaluation

<table>
<thead>
<tr>
<th>Model</th>
<th>Precision</th>
<th>Recall</th>
<th>F1 Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-means</td>
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<td>-</td>
<td>0.40</td>
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<tr>
<td>Random Forest</td>
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<td>SVC</td>
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<tr>
<td>XGBoost</td>
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<td>Naive Bayes</td>
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<tr>
<td>Logistic Regression</td>
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<tr>
<td>Neural Network</td>
<td>0.91</td>
<td>0.90</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Note: weighted metrics shown
Advanced Hybrid Model Assessment

How do you feel?
"My throat feels sore and I have a cough"

Please confirm your symptoms:
- [ ] sore throat
- [ ] fever
- [ ] cough
- [ ] chills
- [ ] headache
- [ ] sneezing

Possible Conditions:
- flu
- common cold
- covid-19

Recommendations:
- Get plenty of rest
- Drink plenty of fluids
- Follow-up with your medical provider

Historical Data
Classification Neural Network
Asclepius LLM
Future Work

01. Web Hosting
   - Not available publicly to users due to cost constraints

02. More User Interaction
   - Add back-and-forth with chatbot
   - “Other” symptom fill-in-the-blank option
   - Help button

03. Model Improvements
   - Add more data to neural network
   - Switch Asclepius to GPT
Thank you!

Join us in our quest, one assessment at a time.
Advanced Hybrid Model Assessment

1. After the user has written the text in the app, we pass it to our LLM with additional prompting to get what top 5 diseases can be compatible with the symptoms. We can also ask for the ICD10 to be able to track it down in the dataset.
2. From the historical patient dataset, we build a pivot table of all diseases with all the possible symptoms that could be related: Disease, Symptom1, Symptom2... We added this pivot table to the ICD10 code so we can query from the LLM recommended diseases.
3. We query the found diseases in the pivot table from step 2.
4. All these distinct symptoms are passed to the user in the app with checkboxes for additional context understanding.
5. We train a classification model based on the dataset.
6. With this enriched information from user, we run inference on the classification model to get the final curated list of diseases competitive.
7. Finally, we display the diseases with its probability to user.
8. Optional: We can add a brief description using LLM to describe the diseases and explain it to the user.
9. Optional: Get the next steps directly from the user text and the LLM.
Health Insurance Status
among working adults 19-64

57%
Insured all year, not underinsured

23%
Insured all year, but underinsured

11%
Insured now, with coverage gap

9%
Uninsured now

https://doi.org/10.26099/73zg-3432
Problems Accessing Healthcare among working adults 19-64

https://doi.org/10.26099/73zg-3432
01. **Problem**
In the US population, roughly 10% of people do not have access to healthcare, and many more are underinsured.

02. **Target Users**
Those uninsured and underinsured with difficulty accessing healthcare will be able to use MedQuest to get quick assessments and next steps.

03. **Impact**
This product would allow more people to have a basic understanding of the symptoms they are having, while also attempting to reduce the load on the ER by directing users to the appropriate medical facility as needed.
Existing Market Solutions

01. IBM Watson for Health
   - Target Users: Healthcare Providers
   - Uses AI to analyze large volumes of data, including medical literature and patient information, to assist healthcare professionals in making more informed decisions about patient care

02. Epic Systems’ Clinical Decision Support (CDS)
   - Target Users: Healthcare Providers
   - Offers real-time alerts and guidelines to physicians based on patient data, including drug interaction warnings, reminders for preventative screenings, and tailored treatment suggestions

03. Teladoc
   - Target Users: Patients
   - Telemedicine service that allows patients to consult with doctors and healthcare professionals remotely
   - Patients can receive diagnoses, medical advice, and prescriptions
Existing Market Solutions

04. WebMD Symptom Checker
- Target Users: Patients
- Online tool where users can input their symptoms and receive a list of potential diagnoses
- Uses an algorithm to match symptoms with medical conditions

05. ADA Health Mobile App
- Target Users: Patients
- Mobile app where users can input their symptoms
- Ada asks follow-up questions to narrow down the possible causes and suggests potential conditions