Daily Meal Planner Expert System for Diabetics Type-2

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Agenda

- Goal and Objectives
- Medical knowledge
- Comparative features for Expert systems for diabetes
- Meal planner
- Conclusion
1. This paper presents the design and implementation of an intelligent medical expert system for diabetes diet that intended to be used in Sudan.

2. Determine the stages and the features in developing a new tool for treat of diabetes type 2.

3. Using these key features as a guide in developing a knowledge based system for diabetes type 2 diet.
1. There are many uncertain risk factors resulted from eating certain types of food with certain amount especially for diabetes patients.

2. Sometimes it is really hard for experts to reach a good tasty and efficient in treatment, meal planning for such patient.

3. An accurate tool will be of a great help for an expert to consider all these risk factors and show certain results.

4. Developing an intelligent systems for diabetic type 2 diet provides self-monitor for patient of type 2 diabetes to get proper amount of daily meal.
Medical knowledge

Diabetes Mellitus

There are three diabetes types:

- Type 1 diabetes or insulin-dependent diabetes mellitus (IDDM)

- Type 2 diabetes, or non-insulin-dependent diabetes mellitus (NIDDM)

- Gestational diabetes, during pregnancy
Medical knowledge

Diabetes Mellitus

- The **normal** blood glucose level lies between *(70-100) mg/100 ml* during fasting.
  and **140 mg/100 ml otherwise**

- For a diabetic person, the blood glucose is around **126 mg/100 ml** during fasting
  and **200 mg/100 ml otherwise**

- In Sudan at around one million diabetic person, around 95% of whom have type 2 diabetes
Medical knowledge

Diabetes Mellitus

Complications

- Stroke
- Blindness
- Heart disease
- Kidney disease
- Nerve damage
- Leg and foot amputations
- Death
Related Work

Comparative Study

The framework includes the following features:

1. System purpose
2. Data representation
3. Inference Engine technique
## Related Work

### Comparative features for Expert systems for diabetes

<table>
<thead>
<tr>
<th>Authors</th>
<th>System purpose</th>
<th>Data representation</th>
<th>Inference Engine technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cindy Marling et. al</td>
<td>CARE-PARTNER diabetes renal, stress-related disorders</td>
<td>Case-based</td>
<td>NA</td>
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<tr>
<td>Joan Albert et. al</td>
<td>Treatment of hypertension, diabetes mellitus and heart failure</td>
<td>Rule based</td>
<td>NA</td>
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<tr>
<td>N. Nnamoko et. al</td>
<td>Type 2 Diabetes Mellitus (T2DM) management</td>
<td>Case-based and Rule based</td>
<td>NA</td>
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<tr>
<td>S. Kumar &amp; B. Bhimrao</td>
<td>Natural treatment information of diabetes in one place</td>
<td>Rule based</td>
<td>Backward chaining</td>
</tr>
<tr>
<td>D. Forbes and J. Singh</td>
<td>Understanding between the Type-2 Diabetes Patient and healthcare practitioner</td>
<td>Ontology. Based</td>
<td>NA</td>
</tr>
<tr>
<td>P. M. Beulah et. al</td>
<td>Detect and give early diagnosis of three types of diabetes</td>
<td>Rule based</td>
<td>Backward chaining</td>
</tr>
</tbody>
</table>
The Proposed Architecture of Expert System
1. **Problem and Need Identification**
   1. Shortage of specialist
   2. no commercially or free expert system is available in this area of diabetes

2. **Knowledge Acquisition**
   1. experts from military hospital and Federal Ministry of Health for medical resources (Dr. Iqbal and Dr. Nazik)
   2. medical books
Meal Planner

3. Formalization
- Calculating food servants semantic network representation is used
- Calculating number of calories, a rule based representation is used
- Frame based representation is used to connect food types and subcategories
Meal Planner

3. Formalization

Diabetics food frame representation

- **Fats & sweets**
  - Type
  - Group
  - Name
  - ID
  - Calories/servant

- **Fats**
  - Type

- **Sweets**
  - Type

- **Milk & protein**
  - Type

- **Milk**
  - Type

- **Protein**
  - Type

- **Fruits & Vegetables**
  - Type

- **Fruits**
  - Type

- **Vegetables**
  - Type

- **Carbohydrates**
  - Type

- **Grains**
  - Type

- **Beans**
  - Type

- **Bread**

- **Oil**
- **Butter**
- **Chees**
- **Fish**
- **Meat**
- **Sugar**
- **Candy**
- **Jam**
- **Chicken**
- **Apple**
- **Eggplant**
- **Cucumber**
Meal Planner

4. Design

The systems used a command driven, dialog type user interface, increasingly windows and menus.

Patient information dialog
**Meal Planner**

4. **Design**

The systems used a command driven, dialog type user interface, increasingly windows and menus.

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**Food group dialog**

<table>
<thead>
<tr>
<th>Starches</th>
<th>Vegetables</th>
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<th>Milk</th>
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<th>حفظ</th>
<th>خروج</th>
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<td>load</td>
<td>save</td>
<td>exit</td>
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</tbody>
</table>
Meal Planner

5. Implementation

writing of the Prolog commands that run the system

- inference engine backward-chaining

- The representing knowledge in a rule based
Results

The system connects all gathered information and performs inferences through its knowledge engine process to output a recommended five meals for every patient per day.

Meal Plan

Breakfast: 2 piece of cake, piece of cheese, piece of apple, piece of bread, 1/2 piece of gorasa
Lunch: 75 gram yogurt, komsha of bean, 3 dates, komsha of molokhia, komsha of okra, 2 piece of kissra
Snack1: ---
Dinner: synth, komsha of fuel, 4 piece of taamiea, small piece of guava, komsha of regal, piece of oasta, steelcup of pasta, steelcup of noodles
Snack2: cup of milk, small piece of orange, custard
Conclusion

1. This paper described the design and implementation of a medical expert system for diabetes diet that intended to be used in Sudan. recommending five meals for every patient per day, breakfast, lunch, snack1, dinner and snack2.

2. The development of the proposed expert system went through a number of stages such problem and need identification, requirements analysis, knowledge acquisition, formalization, design and implementation.

3. Visual prolog was used for designing the graphical user interface and the implementation of the system components using rule based for knowledge representing and backward-chaining for inference engine.

4. The proposed expert system is a promising helpful tool that reduces the workload for physicians and provides a more comfort for diabetic patients.
References


References

Thank You