Food Intake Recognition through Auto dietary System

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Abstract—Nutrition and obesity related sicknesses are now emerging as dangerous to human health. Now people cross on dieting and not taking proper care in their health and meals consumption energy. To remedy these troubles a machine is evolved that's automatic dietary food intake reputation device by means of the use of wearable sensors. It consists of embedded gadget and sign processing system in which food consumption is sensed with the aid of excessive constancy microphone and signal is pre-processed by using embedded hardware part and through blue tooth it is despatched to smartphone. Right here we've got used hidden markov models to understand chewing and swallowing events to extract time and frequency domain features in addition to volume and weight of meals intake. Algorithm for selection is evolved for kinds of food reputation. For eg in weight loss plan manage patient affected by diabetes precisely reveal daily meals consumption. An utility on smartphone and sign processing system in which food consumption is amassed is collected is exceptional indicators [4]. through analog to virtual converter alerts are converted into proper layout. those noise. It's far relaxed to put on. The throat microphone has exceptional indicators [4]. through analog to virtual converter alerts are converted into proper layout. those

II. SYSTEM STRUCTURE

There are primary units in auto nutritional, one is embedded device using for audio records gaining & pre-giving out. Second is the application running on clever phone that implements food type popularity and gives us the information for users.

A. Audio sensors

An excessive constancy & precise throat micro phones accumulate audio alerts at the time of ingesting. The wearable sensor called microphone is placed over the neck. It converts vibrations from the skin to acoustic signals it connects best high quality signals for the motive of computerized dietary machine by lowering interference of noise. It’s far relaxed to put on. The throat microphone has frequency variety of 20Hz-20 KHZ, which is suitable for amassing chunk & swallow sound

B. Hardware system

An embedded hardware device is truly evolved for information working and it is transmitted whilst collected from throat microphone. When facts are accumulated from throat micro Smartphone it is amplified and filtered for high exceptional indicators [4], through analog to virtual converter alerts are converted into proper layout. those

Fig 1: System structure of Auto Dietry [11]
converted signals are shipped to the microcontroller through I2C. The sound signals are divided into frames for further giving out. The microcontroller frames raw alerts from throat microphones, specifically the MSP430 microcontroller [4]. The recorded frames are sent to a Blue-enamel module and also shipped to a smartphone. A lithium battery powers the hardware gadget.

![Fig 2: Hardware Board](image)

**C. cell phone utility**

Application on smartphone works with two roles. First, it works on meals kind popularity, and 2nd, it plays as a statistics manager and affords to interface to users. While users begin to eat, the gadget will apprehend the food type and keep the facts in information base.

The consumer assessments the data and receives hints on wholesome consuming conduct by analyzing information.

![Fig 3: Food Intake Sign Giving Out Information](image)

### III. DATA FLOW OF FOOD RECOGNITION

In three steps, meals are diagnosed. In the beginning, sound frames are accumulated throughout consuming system which encompass chew and swallow trials. Secondly, it includes hidden Markov models which discover bite and swallow occasions from sound frames. In the closing step, every trial is computed to pull out functions and identify diverse meals sorts. Also, those values are evaluated with our simple selection tree to calculate the food kind. [5][6][7].

![Fig 3: Food Intake Sign Giving Out Information](image)
IV. SORTING OF DIVERSE MEALS & ITS REPUTATION

Here on this technique varieties of foods are analogous to chew and swallow occasions that can be done thru calculated feature and time values based totally on previous learning’s or information. Here we've included easy decision tree to pick out diverse foods that allows you to also test the text type in addition to its behaviour pastime. Right here that simple tree used is a massive piece of complete tree to recognize apple and milk as shown in fig 5. To determine those two ingredients first we have extract it characteristic values ie (max peak is calculated) and division satisfies that is taken, once more re system is began to get higher function values inside the processing. Finally once a leaf node is reached, a final choice at the food kind is returned.[8][9][10].

V. RESULTS

![Fig 4: Time area or field sorts for food consumption occasions](image)

(a) Apple (b) Milk

<table>
<thead>
<tr>
<th>Features</th>
<th>Descriptions</th>
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<tbody>
<tr>
<td>High Peak</td>
<td>Maximum value of an event</td>
</tr>
<tr>
<td>Low Peak</td>
<td>Minimum value of an event</td>
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<tr>
<td>Mean</td>
<td>Average value of an event</td>
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<tr>
<td>Variance</td>
<td>The square of Std variance</td>
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<tr>
<td>Variance</td>
<td>Measure of spread of event</td>
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<tr>
<td>ZCR</td>
<td>Measure related with frequency</td>
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<tr>
<td>Skewness</td>
<td>The degree of asymmetry of the data distributon</td>
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<tr>
<td>Kurtosis</td>
<td>whether signal is peaked or flat relative to a normal distribution</td>
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<tr>
<td>Interquartile</td>
<td>Measure of statistical dispersion</td>
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![Fig 5: A part of the selection tree to realize apple and milk](image)

VI. CONCLUSION & FUTURE WORK

On this paper, we’ve provided the automated meals nutritional in complete way for meals intake reputation. We prepared the embedded hardware and clever cell phone utility to acquire various ingredients that is sensed via signal information thru a throat microphone positioned on neck to report audio signals throughout ingesting. Here we have used hidden markov fashions to discover swallow and chunk moves and then they may be processed to attract the time and frequency domain or area capabilities. We developed smartphone apps which now not only includes meals popularity outcomes however also shows for healthier consuming conduct.

The automated food dietary have performance in food recognition especially in recognizing stable meals from liquid meals. The primary cause in the back of that is excessive fidelity &v particular throat microphone which guaranties excessive best signals with the aid of lowering noise. This modern-day layout of automated meals dietary applicable via maximum customers. it could be beneficial for disabled & sick people for those daily that involves every day meals consumption tracking.

Within the destiny we made idea to improve automatic food dietary in various approaches first, we advise to feature special techniques to the gadget including inclusive of quantity & weight of meals intake, second to decrease the size of device that's weared on neck & embedded hardware unit so that consumer can worn like necklace pendant & put in to the chest pocket as well because it ought to work as a bio monitoring tool.

REFERENCES


