

# ChewFiit's

Chew better live better

**Chewing sound interpretation  
powered by deep learning**



COSIMA '23



GEFÖRDERT VOM



# The ChewFiit's Team

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# Obesity is a Pandemic

WHO reports the world is experiencing **Decay of Nutrition**



In 2016, WHO reported

**1.9 billion**  
adults were overweight

**650 million**  
were obese



The global crisis affects

**39%**  
of adults

**379 million**  
of children under the age of 19

**While obesity is preventable, it remains an unsolved problem without a solution in sight**



Multitude of digestive system issues is traced back to the manner in which people chew their food



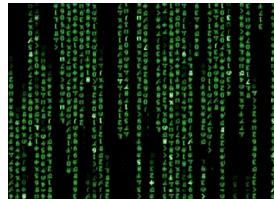
Numerous devices measure exercise calories, but there's a gap for one identifying consumed food and calorie intake

# Healthy food choice is a lifestyle

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# How ChewFiit's can support to make a healthier food choice



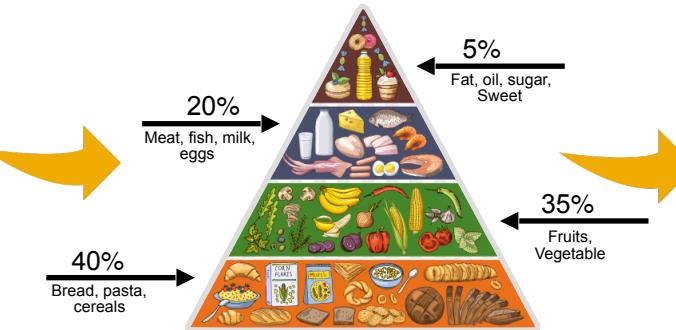
We all know how apple crunches while eating!  
Do you know we can have wearables identify  
the food from that sound?



Crunch!  
Crunch!



HEALTHY FOOD PYRAMID

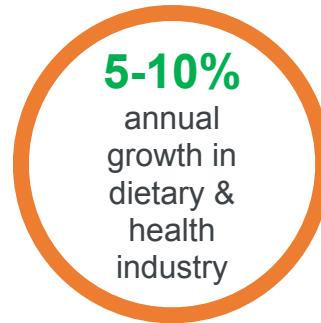


95  
calories

Embedding algorithm in common wearables will decipher chewing (through speed of chewing and jaw muscle movement) and identifying food & calories intake

# Growing smart wearables demand & health awareness – ChewFiit's is the optimum solution

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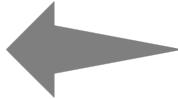


**ChewFiit's is a perfect solution**

# **ChewFiit's AI Health & Nutrition Dashboard**



**Lifestyle preference & factors**



**Personalized Health & Nutrition tracking dashboard**



**Integration with wearable devices**

**AI-Powered Accuracy**

Accurately analyze food items, portion sizes, & nutritional content

Reducing manual efforts and errors

**Personalization**

Personalized recommendations and meal plans based on individual dietary goals, preferences, and health conditions

**Real time Feedback**

Users to receive instant feedback & insights on their eating habits (nutrient intake, calorie consumption) & potential improvements

# **Thank You**

# Appendix

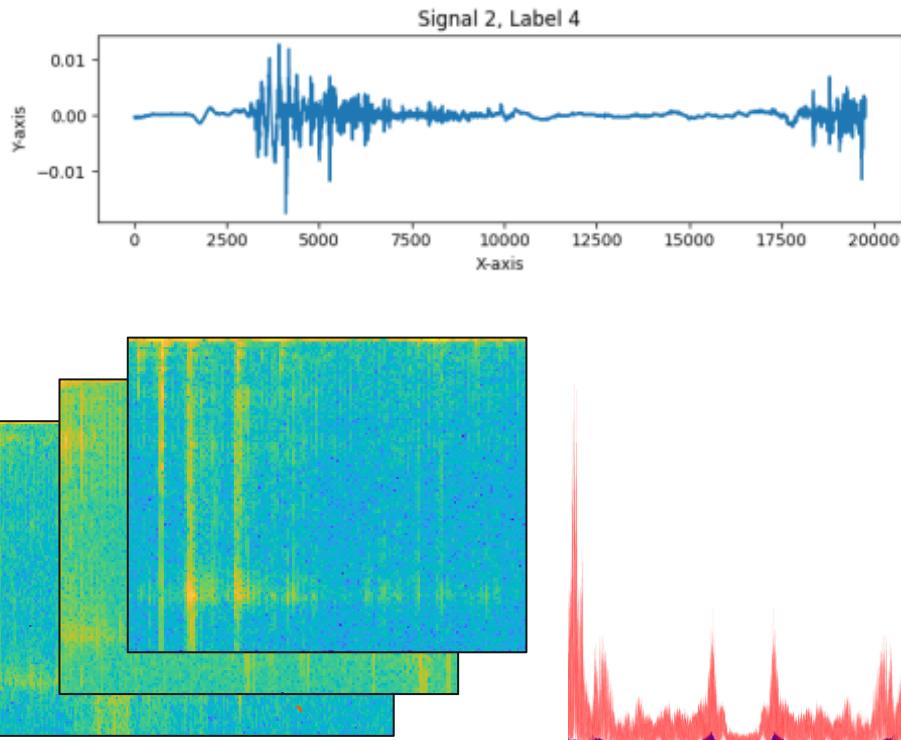
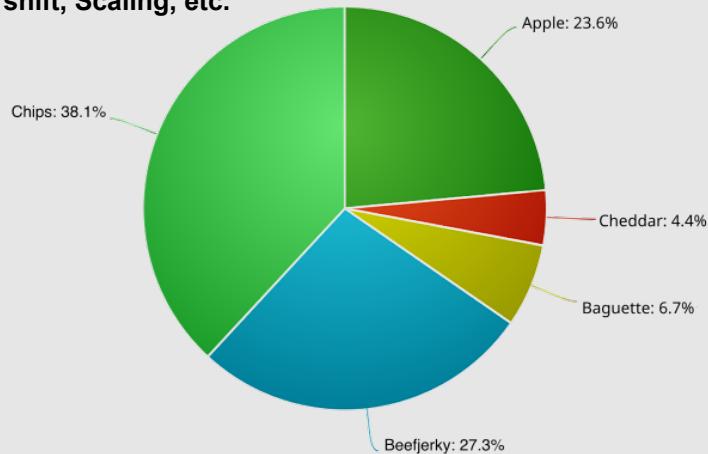
# Data Insights

## Data Preparation

- Tabular Dataset
  - +2500 rows
  - 16 columns
- Time Series Dataset
  - +2500 time series file
- Spectrogram Dataset
  - +2500 images

## Data Augmentation

- Phase shift, Scaling, etc.



# Model Planning

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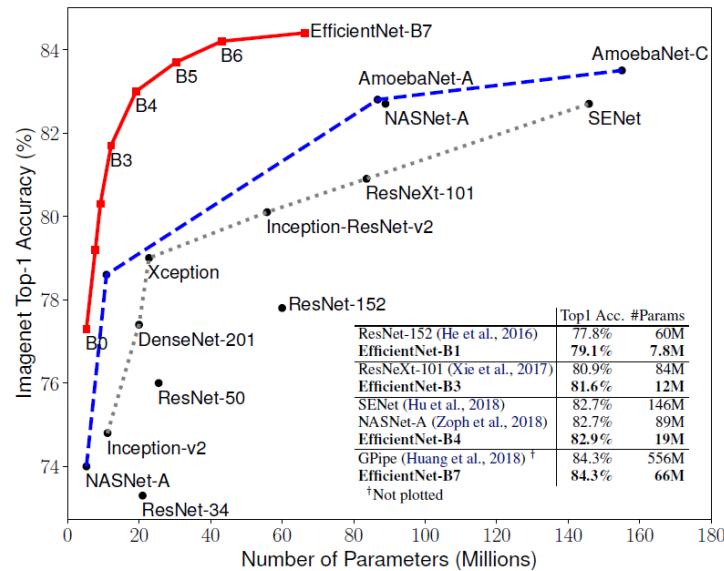
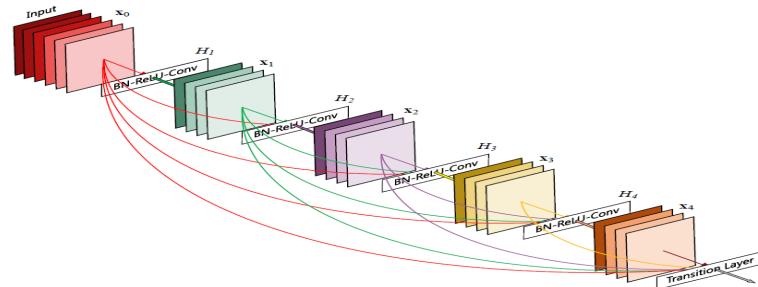
Models	Potential Use
CNN	Image recognition, object detection, image classification
LSTM	Time series prediction, natural language processing, speech recognition.
SVM	Classification, Regression
Transformer	Efficient natural language processing, machine translation, sequential tasks

## CNN

## CNN(Convolutional Neural Network):

CNNs are a specialized kind of neural networks for processing data that has a known grid-like topology. They are powerful for different pattern recognition tasks, ranging from image processing to voice recognition.

# Architecture



# LSTM

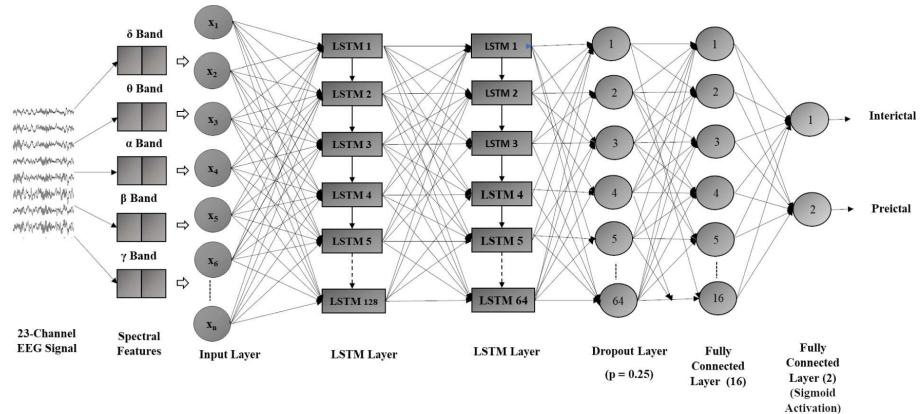
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## LSTM (Long Short Term Memory):

RNN networks are ideal for sequential data like signals. They extract relevant features and patterns, capturing long-term dependencies and temporal relationships.

## Architecture

Recurrent neural network with memory cells for processing sequential data.



# SVM

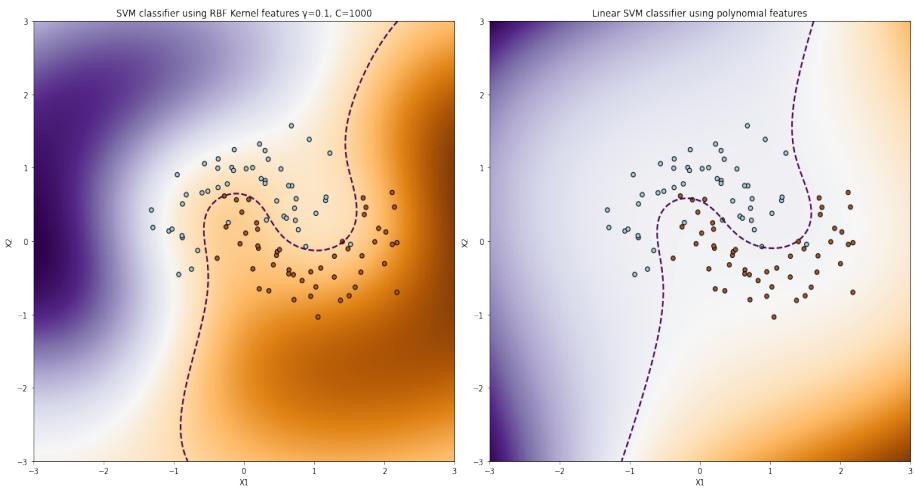
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## SVM (Support Vector Machine):

Suitable for linear/nonlinear classification and regression, suits various data types like text/images/tables.

## Classification with SVM

Powerful classification method using hyperplanes to separate data points into distinct classes.



# Transformer

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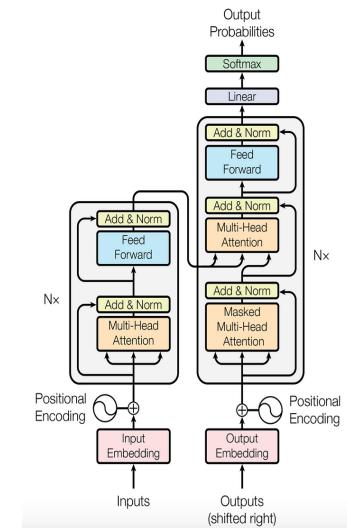
The Transformer model, known for NLP, excels in image classification (ViT). Its attention mechanism and global dependency capture make it powerful for complex sequential data. Treating signals as sequences allows the Transformer to analyze time series signals.

## Comparison to Other Machine Learning Models

The Transformer model has superiority to capture global dependencies which indicates its possible advantage in specific sequential/visual tasks.

## Types of Transformers

- Vanilla Transformer
- Vision Transformer (ViT)



Source: "Attention Is All You Need" paper [4]

# Increasing awareness of a healthy lifestyle and rising adoption of wearable devices will lead to a substantial opportunity for AI-powered food intake tracking model



# References

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- [8] <https://www.globaldata.com/media/medical-devices/global-wearable-technology-market-set-to-surpass-54-billion-in-2023/>
- [9] [Two-layer LSTM network-based prediction of epileptic seizures using EEG spectral features \[2\]](#)
- [10] <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>