

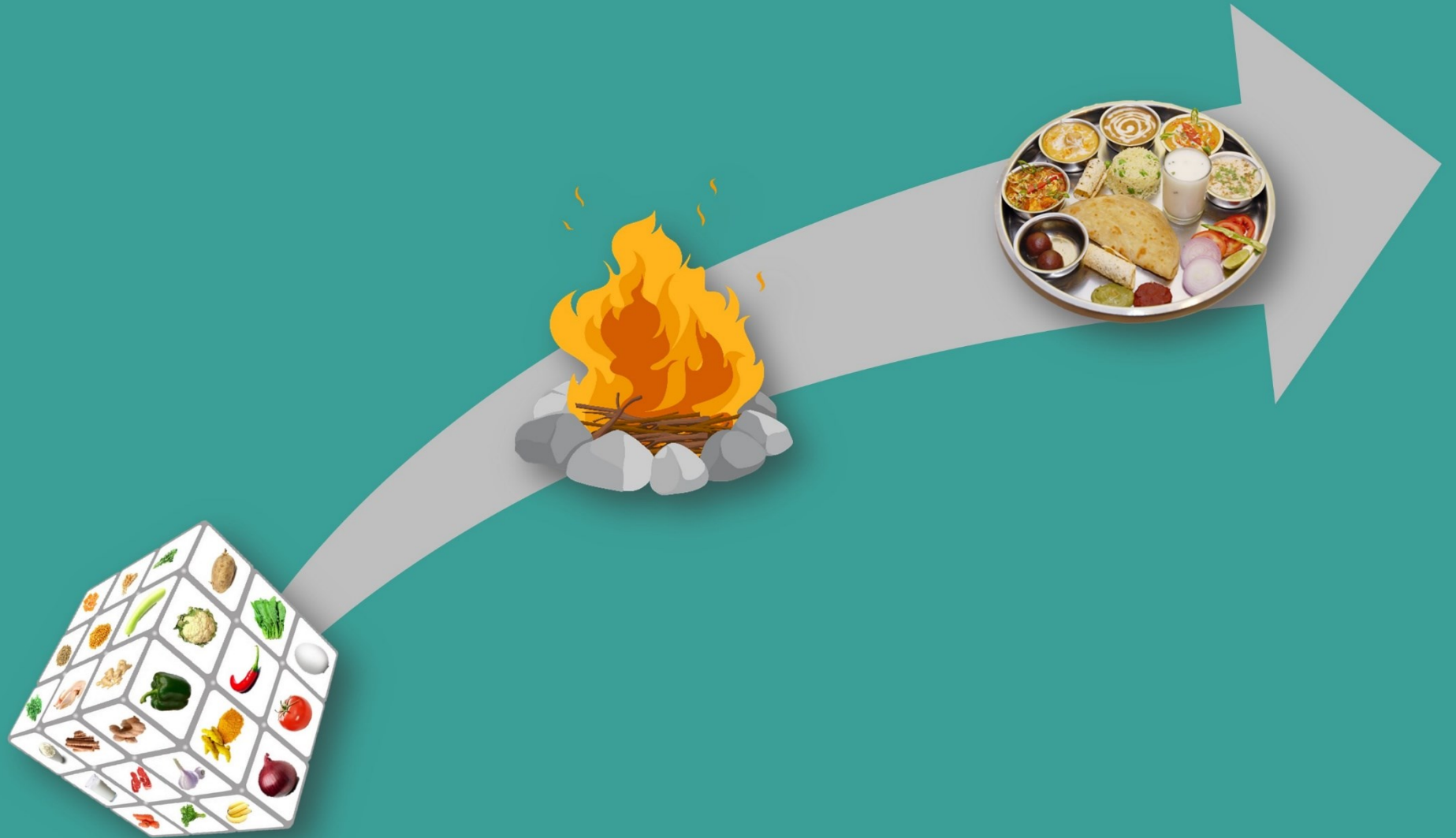


**GANESH BAGLER**



<http://cosylab.iiitd.edu.in>

# Food is alchemy





**Innovation** [noun]

**make changes in something established,**  
especially by introducing new methods, ideas, or products.









**BIG DATA**



## VOLUME

Huge amount of data



## VARIETY

Different formats of data  
from various sources



## VERACITY

Inconsistencies and  
uncertainty in data



## VALUE

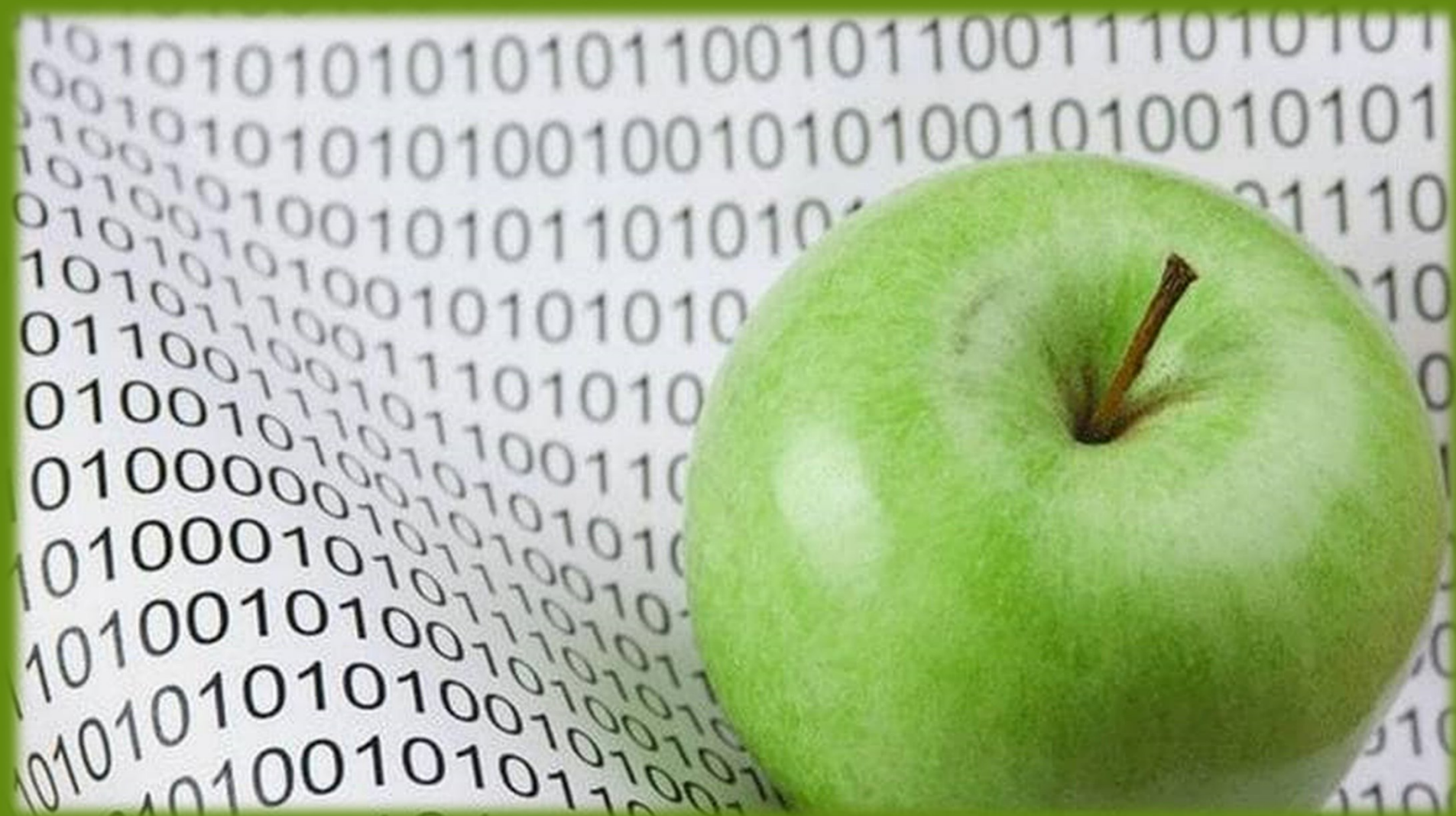
Extract useful data



## VELOCITY

High speed of  
accumulation of data





Computational Gastronomy is a data science that blends food, data, and computation for data-driven food innovations.



Artificial Intelligence



AI



# Sources of information on disease outbreak

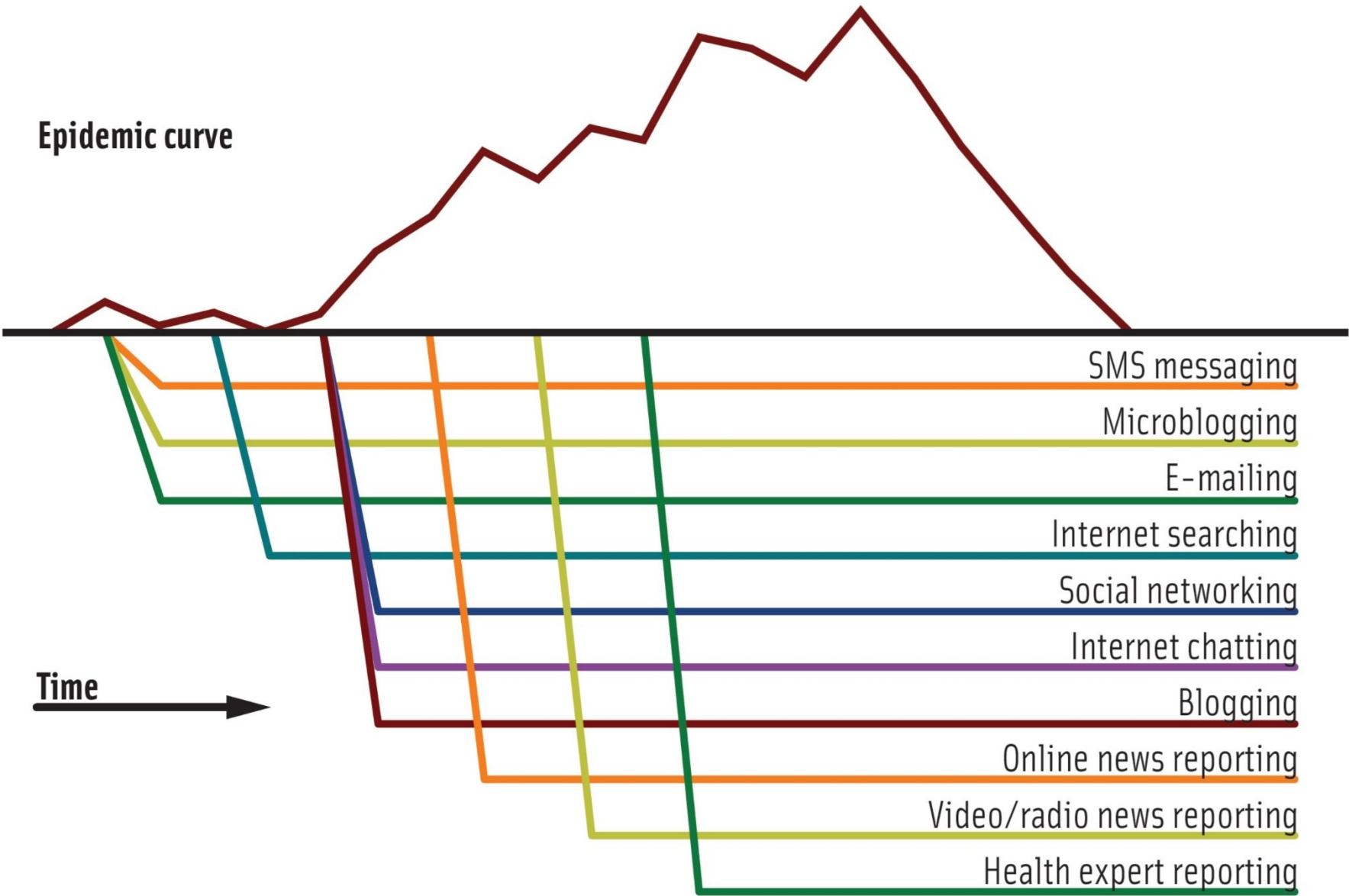


Figure 1. Hypothetical Timing of Informal Electronic Sources Available During an Outbreak.

From Keller et al., 2009.

# 100K PATHOGEN GENOME PROJECT

- Increase food safety by **microbe systems biology**
- **Predictive biomarkers** for specific traits
- **Rapid ID and tracking**
- **Understand evolution** to build more robust detection system
- **New isolate emergence** and persistence
- **Integration** into current practices



# Use of GIS for prediction of foodborne pathogen hot spots



*Listeria monocytogenes*



# Recipes → Ingredients → Flavor Molecules

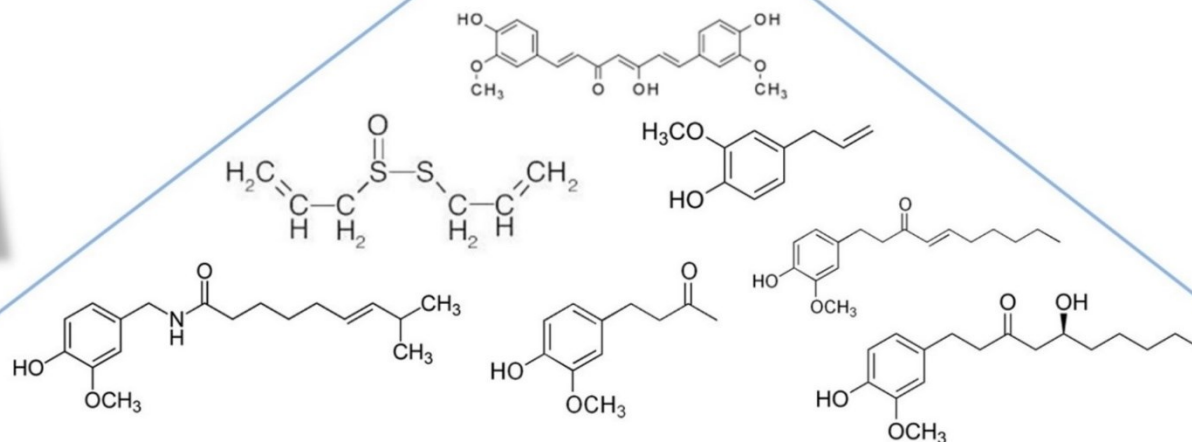
2543 Traditional Indian Recipes (TarlaDalal)

Regional cuisines: Bengali, Gujarati, Jain, Maharashtrian, Mughlai, Punjabi, Rajasthani, South Indian.



- Additive
- Animal product
- Beverage
- Cereal/ Crop
- Dairy
- Fish/ Seafood
- Flower
- Fruit
- Herb
- Meat
- Nut/ Seed
- Plant
- Plant derivative
- Pulse
- Spice
- Vegetable

PubMed  
PubChem  
Fenaroli's Handbook





# Culinary Fingerprints





Spice

The Taste of India



A View from **Emerging Technology** from the arXiv

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## **Best of 2015: Data Mining Indian Recipes Reveals New Food Pairing Phenomenon**

By studying the network of links between Indian recipes, computer scientists have discovered that the presence of certain spices makes a meal much less likely to contain ingredients with flavors in common. From February ...

December 30, 2015

**MIT  
Technology  
Review**

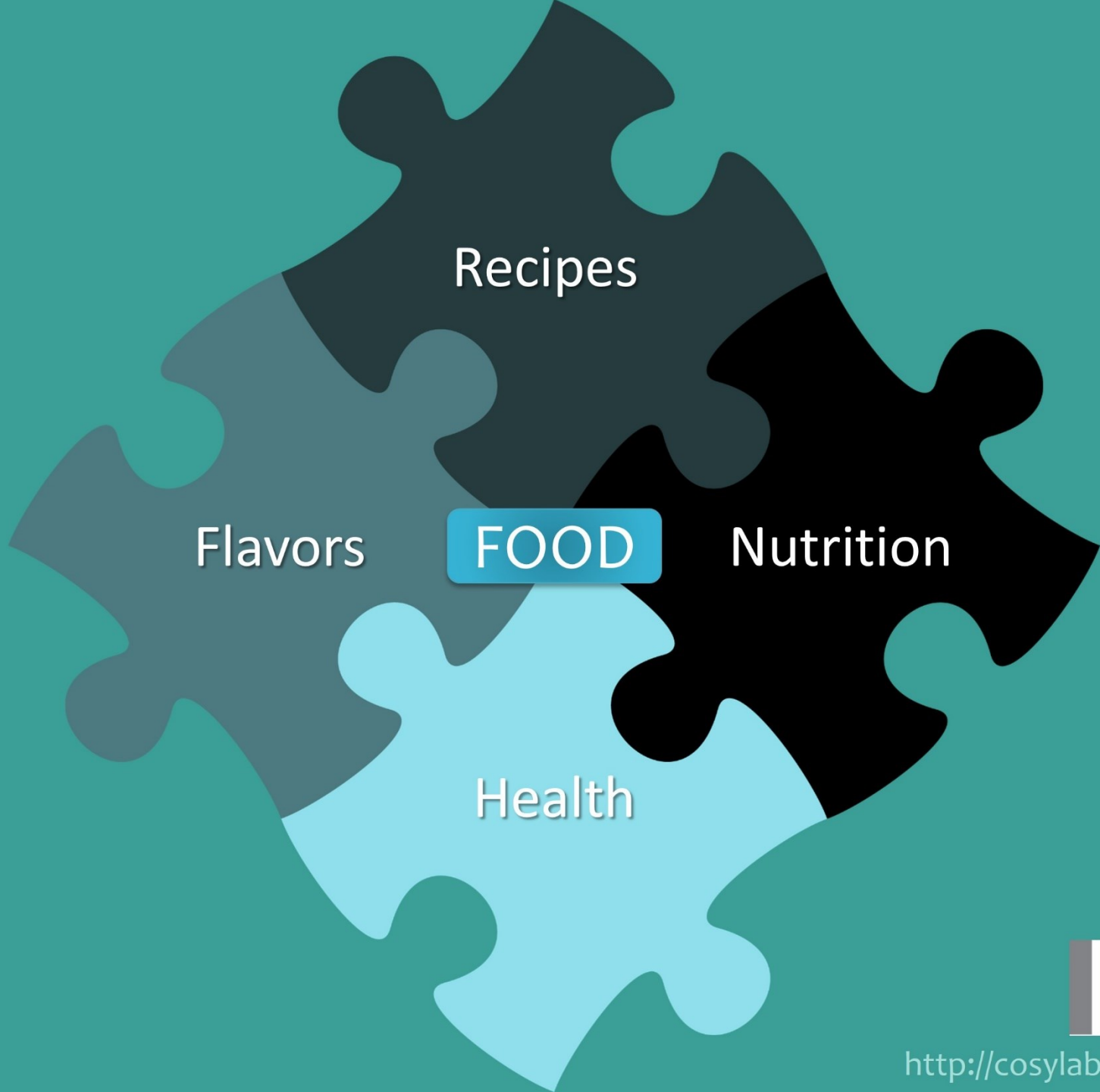
**Best of 2015**

MIT Technology Review

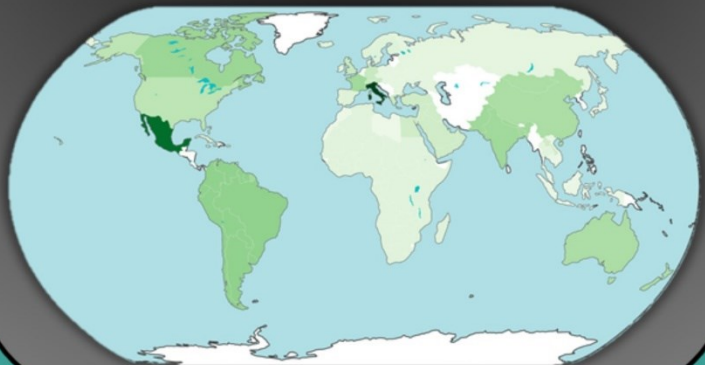
“The intersection of food science, data and computation is one of the most exciting frontiers, and your work is right in this sweet spot.”

Sam Arbesman  
Scientist in Residence, Lux Capital





# RecipeDB



<http://cosylab.iitd.edu.in/recipeadb>



# FlavorDB

## Trending Flavors

- ↗fruity
- ↗vanilla
- ↗mousy
- ↗balsamic
- ↗sweet
- ↗apple

## Ingredient Categories



Dairy



Fruit



Fish



Herb



Meat



Bakery

VIEW ALL INGREDIENT CATEGORIES



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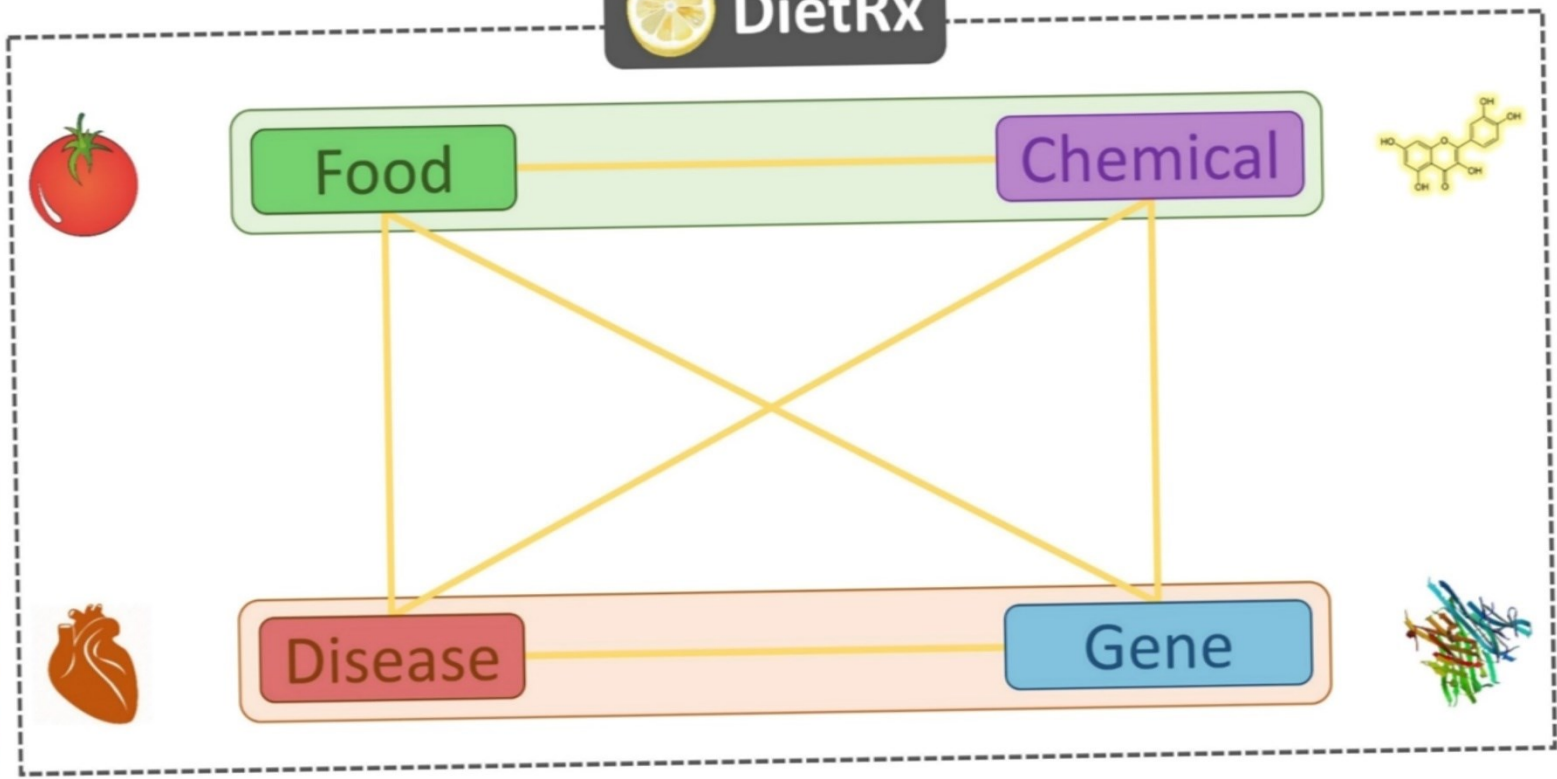


<http://cosylab.iitd.edu.in/flavordb> Google Play



$$f(\text{Food} \otimes \text{Person}) = \text{Stethoscope}$$

# DietRx



# Culinary Fingerprints of the World Cuisine





## Taste Prediction



Scientific Reports (2019)

<https://cosylab.iiitd.edu.in/bittersweet>

# Ratatouille—Can computers cook?





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