Tracking F&B Consumption

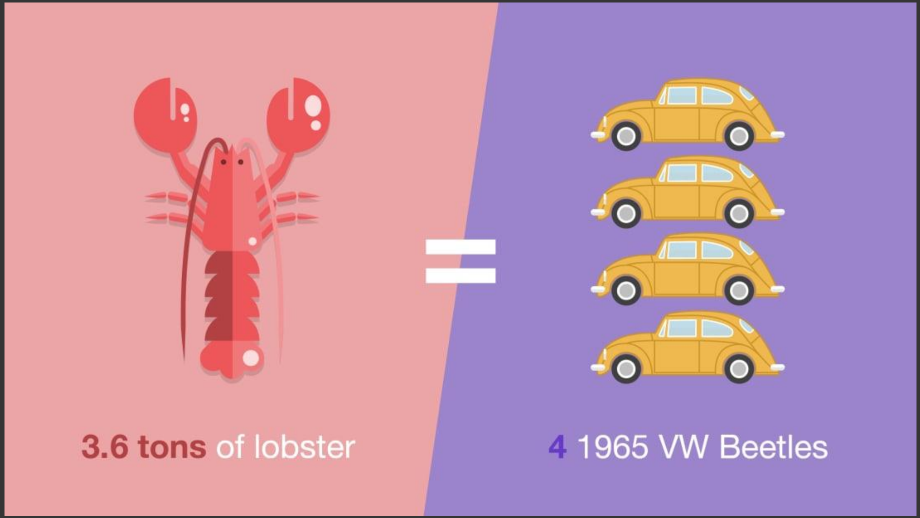
- Team Blitzkrieg

Problem statement

According to the *International Air Transport Association*, airlines produced **5.2 million tons** of waste last year and will produce over **10 million tons** annually by 2030.

On an average, chefs cook huge array of food.
- 58 million bread rolls
- 15 million croissants
- 13 million eggs
- 4,300 tons of chicken
- 3.6 tons of lobster.

Shelf life from cooking to eating - 72 hours

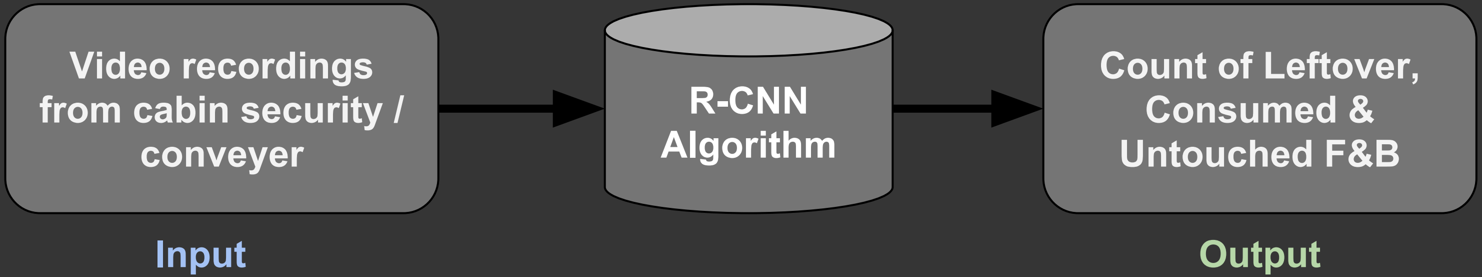


Value Proposition

“SnakeEye” is an AI-based system integration platform that uses Object detection & Deep learning techniques to detect & classify F&B into three types

- Untouched
- Leftovers
- Consumed

Our algorithm will then count the number of times each category has appeared and correspondingly update it in the database.



Video recordings from cabin security / conveyer

R-CNN Algorithm

Count of Leftover, Consumed & Untouched F&B

Input

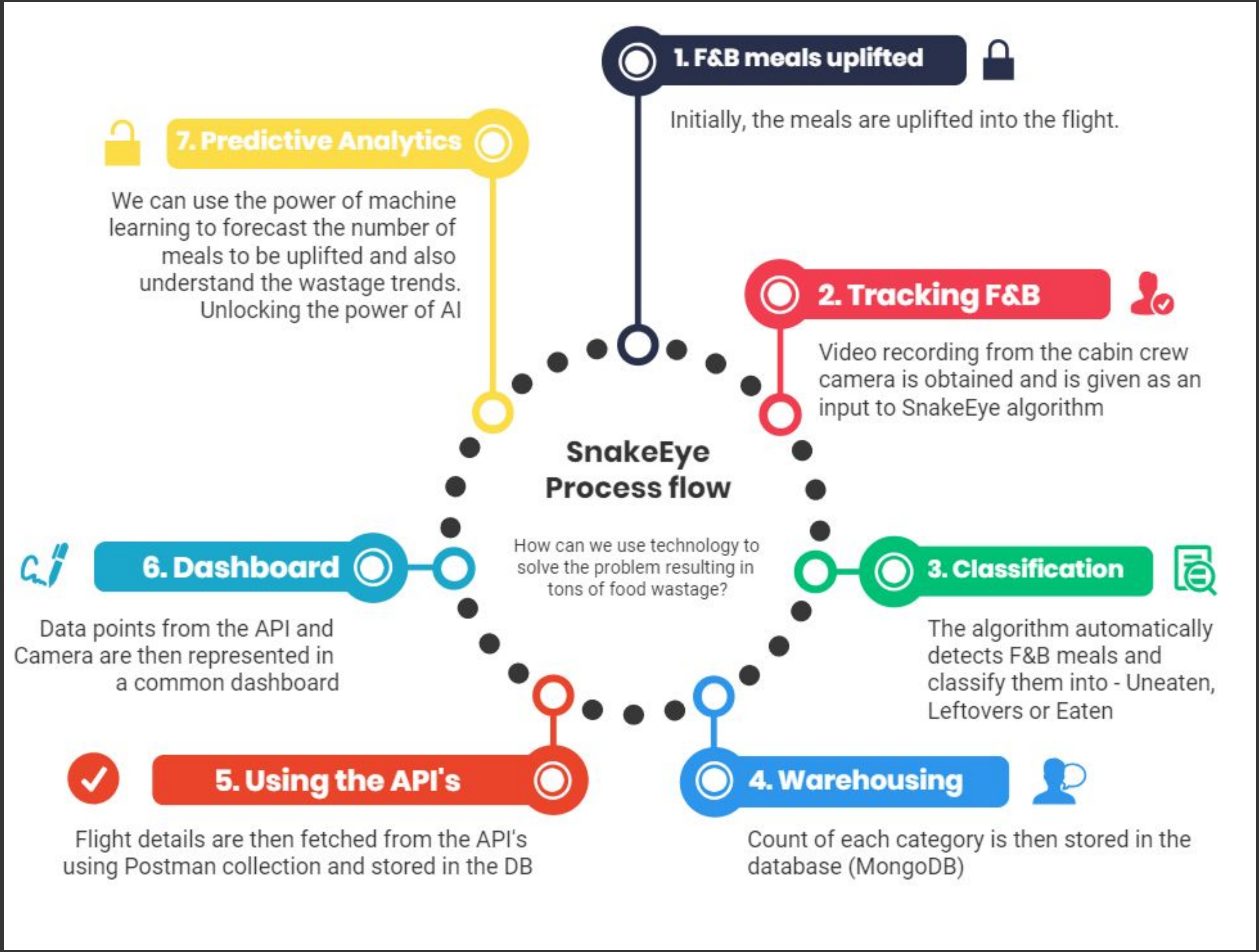
Output

Current Scenario:

- Presently, there is lot of manual intervention involved in terms of counting the wasted meals.
- Then the numbers are entered manually in a spreadsheet.
- Wastage(%) is then computed based on the capacity of the flight.

Proposed solution:

- Having a system in place that automatically counts & classifies meals
- Store the count in the database along with other details of the flight from the API (Capacity, Number of people, Gender, Age, Diet & so on)
- Dashboarding everything in a single place for management to track.



SnakeEye Process flow

How can we use technology to solve the problem resulting in tons of food wastage?

1. F&B meals uplifted

Initially, the meals are uplifted into the flight.

2. Tracking F&B

Video recording from the cabin crew camera is obtained and is given as an input to SnakeEye algorithm

3. Classification

The algorithm automatically detects F&B meals and classify them into - Uneaten, Leftovers or Eaten

4. Warehousing

Count of each category is then stored in the database (MongoDB)

5. Using the API's

Flight details are then fetched from the API's using Postman collection and stored in the DB

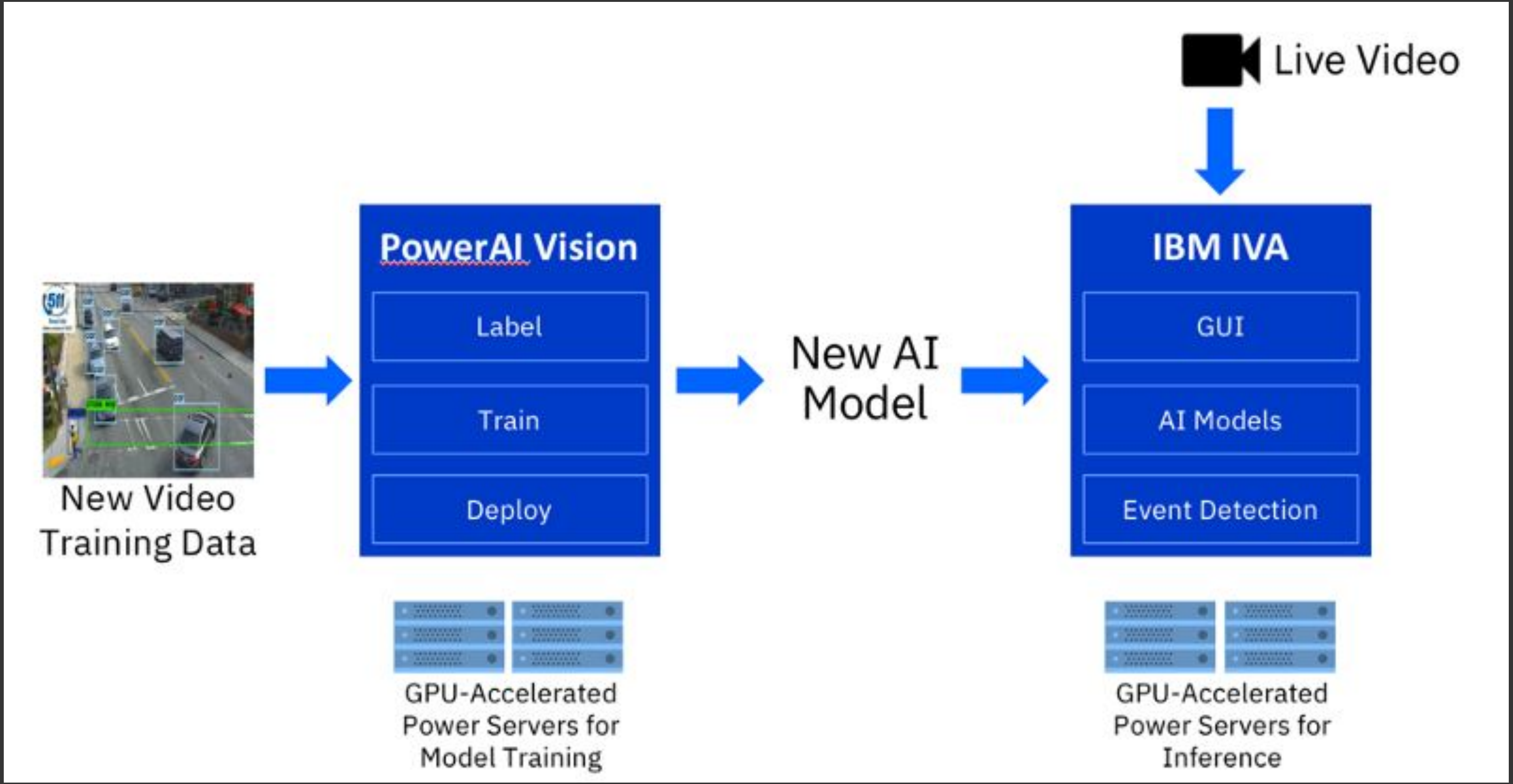
6. Dashboard

Data points from the API and Camera are then represented in a common dashboard

7. Predictive Analytics

We can use the power of machine learning to forecast the number of meals to be uplifted and also understand the wastage trends. Unlocking the power of AI

Core Architecture



Demo

(Click on the play icon)

Using SIA's Postman collection to fetch flight & passenger info

Link - https://youtu.be/R-N4GLBP7N8

Other Applications - Tracking Inventory

SnakeEye’s algorithm can also be used to track Inventory thus addressing to second problem statement.

This will happen in four stages -

1. Algorithm runs on camera recordings from washing area
2. Counts and categories kitchen items such as spoons, plates etc
3. This is stored in backend along with other flight info fetched from API’s
4. Reflected in a real-time dashboard for management

Core Technology:

1. Deep learning:

   R-CNN implemented using Python & Tensorflow

2. API's Provided by SIA:

   /flightschedule, /flight/passenger, /equipment/loadplan - Using Postman collection to fetch data into the database.

3. Dashboarding:

   Node.js, D3.js and MongoDB

4. Predictive Modeling:

   Python, Scikit-Learn, Numpy & Pandas

Cost to implement:

Cabin waste costs the industry *$500mn* per year, according to IATA, a figure that it says is rising faster than waste volumes thanks to growing disposal costs.

SnakeEye's one-time implementation cost includes

➔ Hardware & Infrastructure costs
➔ Server (for Deep learning)
➔ Systems integration & maintenance

Aside from reducing F&B wastage, the platform will also greatly enhance customer service.
Collated data helps in understanding customer behaviour, thereby providing a personalized service.

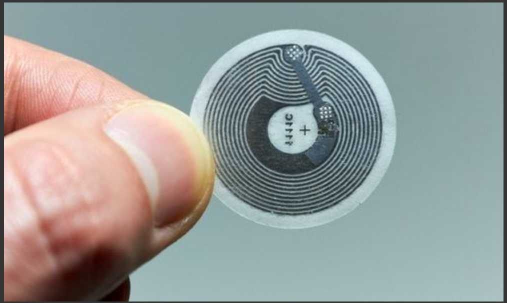
How can we use Machine learning?

Predicting count of F&B meals to be uplifted for a particular flight based on historic trends

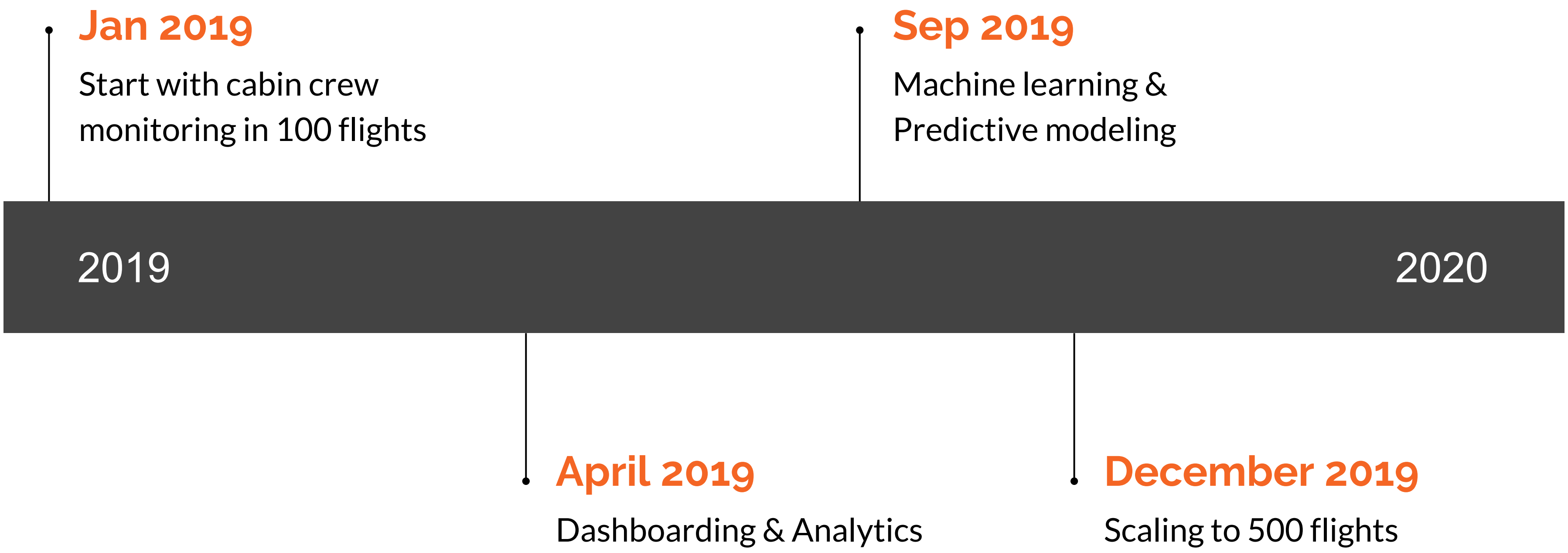
Studying consumer behaviour and dietary preferences

Discover the trend leading to wastage wrt gender, age, demographics

Is there any other way to track F&B consumption?

Technology	Description
	Using NFC tags on the cover of F&B package. Gives us a direct count to opened meals
	Using IR/ Heatmap camera to count meals showing higher temperature indicating that its has been consumed

Roadmap



Jan 2019

Start with cabin crew monitoring in 100 flights

April 2019

Dashboarding & Analytics

Sep 2019

Machine learning & Predictive modeling

December 2019

Scaling to 500 flights

Team Blitzkrieg

Naman Doshi

Data Scientist.
Data Science Weekly;
Blibli.com;
Prefers “Jupyter” over earth.

Ayush Verma

Backend Dev.
Postman API Tools;
Nokia Siemens;
Turns coffee into code.

Sources -

1. Research paper - Fast R-CNN for Object detection & Pattern recognition
2. Code repository - Github
3. Video demo - YouTube
4. Presentation - Google Slides
5. Dashboard - Demo

Thank you