Data Analytics for DHL Logistics Facilities

Category: *Data Analytics*

Team Details:

Team Leader: Nithish V

Team Members: Narendra Prasath V, Sathish S B, Sriharikota Arun Kumar

Skills Required:

Exploratory Data Analysis, IBM Cloud

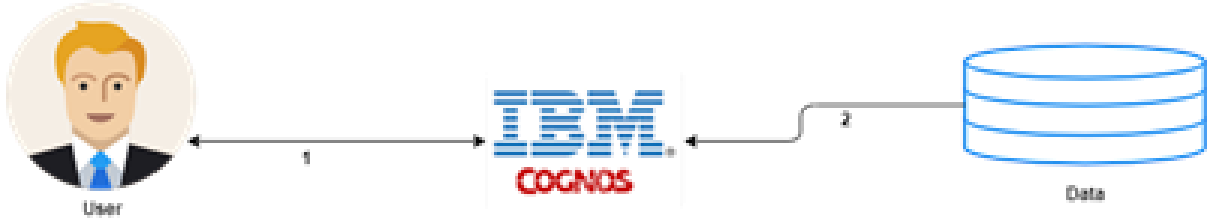
Project Description:

DHL is an international Umbrella brand and trademark for the courier, package delivery, andexpress mail service which is a division of the German logistics firm Deutsche Post. The company group delivers over 1.6 billionparcels per year.
The company DHL itself was founded in San Francisco, USA, in 1969and expanded its service throughout the world by the late 1970s. In 1979, under the name of DHL Air Cargo, the company entered the Hawaiian Islands with an inter-island cargo service using two DC-3 andfour DC-6 aircraft. Adrian Dalsey and Larry Hillblom personally oversaw the daily operations until its eventualbankruptcy closed the doors in 1983. At its peak, DHL Air Cargo employed just over 100 workers, management, and pilots.

Goal of the Project:

To provide Analytics to improve New Marks and grow the business.

Technical Architecture:



Solution Requirements:

Services Used: IBM Cognos Analytics.

Project Objectives

By the end of this Project, you will:

- *Know fundamental concepts and can work on IBM Cognos Analytics*
- *Gain a broad understanding of plotting different visualizations to provide the suitablesolution.*
- *Able to create meaningful Visualizations and Dashboard(s).*

Project Flow

- *Users create multiple analytical graphs/charts/Visualizations.*
- *Using the Analytical Visualizations, build the requiredDashboard(s).*
- *Saving and visualizing the final dashboardin the IBM Cognos Analytics.*

To accomplish this, we have to complete all the activities and tasks listed below:

- *IBM Cloud Account*
- *Login to Cognos Analytics*
- *Working with the Dataset*
- *Understanding the Dataset*
- *Loading the Dataset*
- *Data Visualization Charts*

Build the following visualizations

- *City-wise No of Pickupsmade?*
- *City-wise No of Objectsserviced?*
- *State-wise No of Cities,where DHFL Servicesare provided?*
- *Total Number of Objects IDs Serviced by DHFL - SummaryCard*
- *Zip Code wise Number of Objects Serviced?*
- *Location Type Filters*
- *Placement Filters*
- *Mach StatusFilters*
- *Location TY Filters*
- *Location TH Filters*
- *Top Contributor Countries /Cities? - Geo Map display*

- **Data Collection.**
  - Collect the dataset or create the dataset

- **Data Pre-processing.**
  - Import the ImageDataGenerator library
  - Configure ImageDataGenerator class
  - ApplyImageDataGenerator functionality to Train set and Test set

- **Model Building**
  - Import the modelbuilding Libraries
  - Initializing the model
  - Adding Input Layer
  - Adding Hidden Layer
  - Adding Output Layer
  - Configure the LearningProcess
  - Training and testingthe model
  - Save the Model

- **ApplicationBuilding**
  - Create an HTML file
  - Build Python Code

IDEATION & PROPOSED SOLUTION

Data and analytics are transforming many industries and businesses, and logistics is not an exception. The complex and dynamic nature of this sector, as well as the intricate structure of the supply chain, make logistics a perfect use case for data. Valuable insights obtained through data leveraging enable the industryplayers tooptimize routing,to streamline factoryfunctions, and to give transparency to the entire supply chain, for the benefitof both logistics and companies alike. Althoughthe data that needs to be processed andmanaged becomes highly complex, it's worth the effort to adopt the data culture as advanced data analytics helps consolidate an industry that has been traditionally fragmented.

The arrivaland spread of big data usage dramatically changed the way businesses use to work with their analytics. Companies can now anticipate slow and busy periods, potential future supply shortage, andactaccordingly. According to the research, as much as 93% of shippersand 98% of third-party logistics companies believe that data analytics is critical to making intelligent decisions. 71% of them believe that big data improves quality and performance. New digital platforms will help remove supply chain inefficiencies, solve problems associated with asset underutilization, improve demand-supplymatching, and increasevisibility and connectivity across systems. The use of thesolutions that willenhance operational clarityand connectivity betweenpreviously sealed systemsenables stakeholders to connect throughout the supply chain.

BRAINSTROM AND IDEA PRIORITIZATION

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

BEFORE YOU COLLABORATE

A little bit of preparation goes a long way with this session. Here's what you need to do to get going

DEFINE YOUR PROBLEM STATEMENT

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

BRAINSTROM

Write down any ideas that come to mind that address your problem statement.

GROUP IDEAS

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

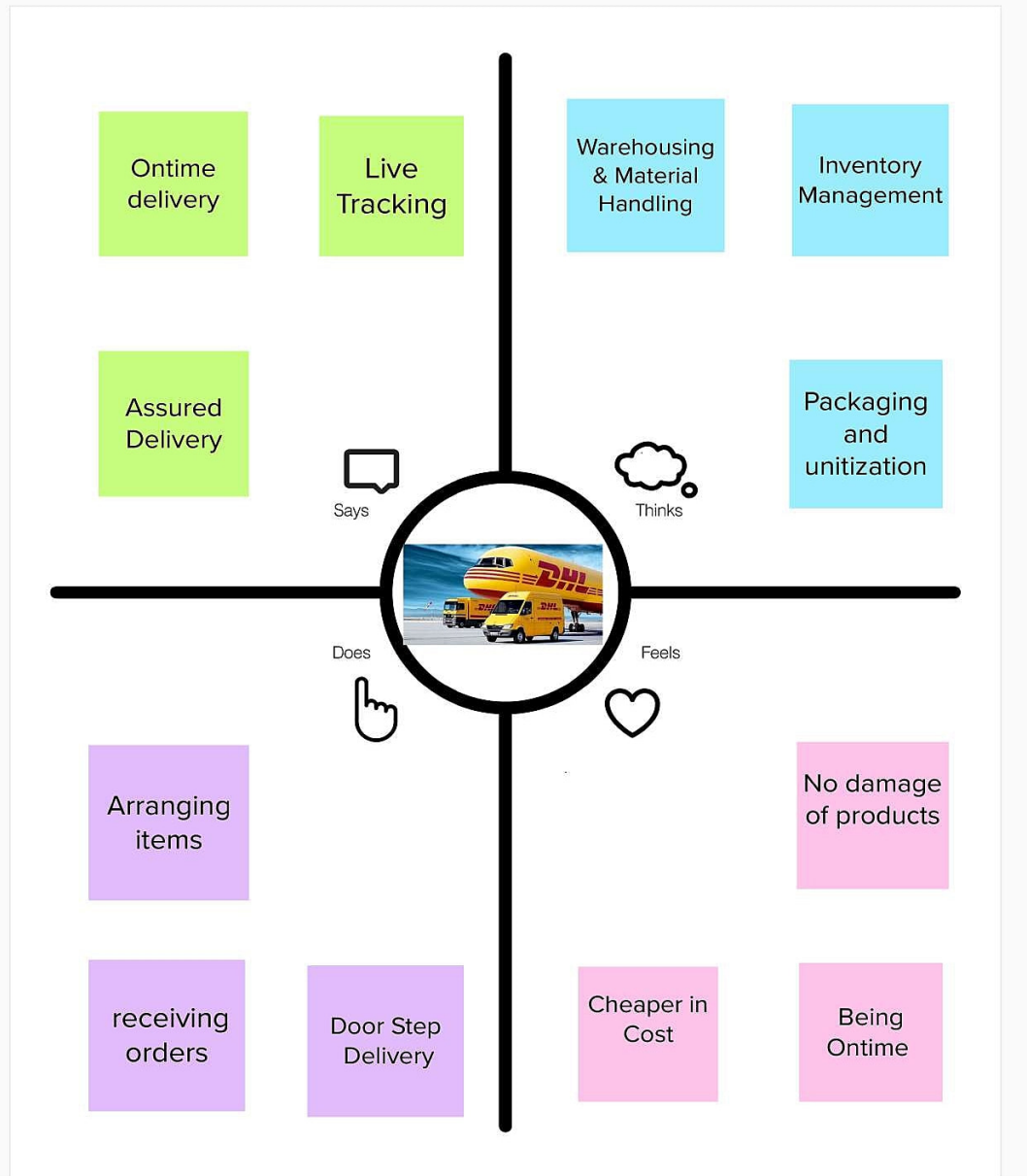
PRIORITIZE

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

AFTER YOU COLLABORATE

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

EMPATHY MAP CANVAS


Ontime delivery
Live Tracking
Warehousing & Material Handling
Inventory Management
Assured Delivery
Packaging and unitization
Says
Thinks
Does
Feels
Arranging items
No damage of products
receiving orders
Door Step Delivery
Cheaper in Cost
Being Ontime

SOLUTION FIT

Project Title: Data Analytics for DHL Logistics Facilities

Project Design Phase-I - Solution Fit Template

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Client analytics is the act of gathering information from various sources and combining it to form a comprehensive picture of the customer. This data may contain details about client demographics, past purchases, and website usage.

6. CUSTOMER CC

Teams that are not aligned, lack commitment and show little patience complexity and prejudice

5. AVAILABLE SOLUTIONS AS

Usage of Big Data Analytics

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Within a company, there is a lack of coordination between various teams or departments, which is not beneficial in the near term.

9. PROBLEM ROOT CAUSE RC

There are several issues facing the logistics sector today, particularly with the integration of e-commerce and new data sources like cell phones and sensors. GPS and other gadgets

7. BEHAVIOUR BE

An analysis of the most recent big data analytics applications in the logistics and transportation industries.

Focus on J&P, tap into BE, understand RC

3. TRIGGERS TR

Monitoring 24/7 , User friendly interface

4. EMOTIONS: BEFORE / AFTER EM

Before: Keeping track of records for commodities is difficult.

After: Now, businesses may predict busy and sluggish times. future supply shortages that may occur and take appropriate action

10. YOUR SOLUTION SL

Regarding the way in which organizations now use their analytics Now, businesses may predict sluggish and busy times as well as anticipated supply shortages in the future.

8. CHANNELS OF BEHAVIOUR C

Along with a growth in data volume, data processing technologies will also become more powerful.

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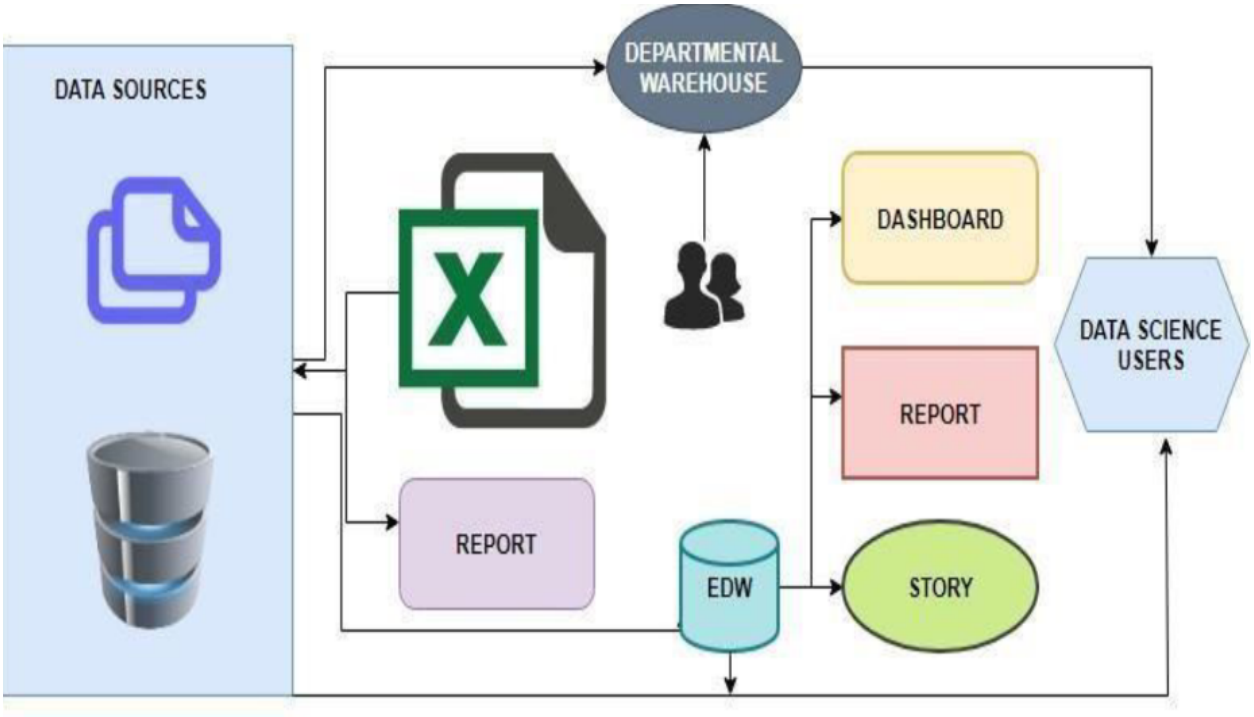
SOLUTION ARCHITECTURE



PROPOSED SOLUTION

S. No	Parameter	Description
1.	Problem Statement (problem tobe solved)	The biggest problems in the logisticsindustry come from its inconsistency and fragmentation. Since there are many parties involved (manufacturers, storekeepers, drivers, managers, and end users) it's impossible to have centralised control over everystepof the way.
2.	Idea / Solution description	Idea management software structures the process of gathering and developing ideas aroundbusiness focus areas, including product development, day-to-day processes, customer feedback, market trends, and competitive insights, with the goal of organizing and managing thoseideas for improvement or development.

3.	Novelty / Uniqueness	As a Thought leader in the logisticsindustry, DHL structurally invests in trend research and solution development.The nature of the workplace, work culture, and workforce are evolving.

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data entersand leaves the system, what changes the information, andwhere data is stored.

TECHNICAL ARCHITECTURE

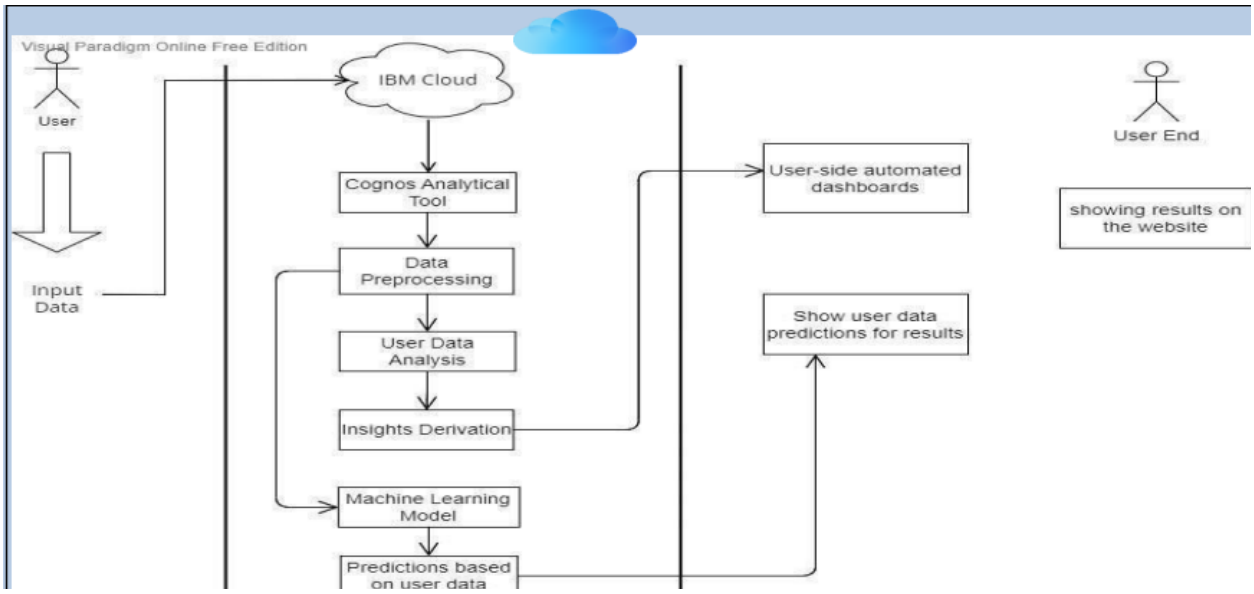


Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	User uploads the csv or excel formatfiles into the webpages	HTML, CSS, JavaScript
2.	Application Logic-1	The user datawill pass into the IBM cloudfor storing and acts as a datasource	IBM cloud
3.	Application Logic-2	In cloud, datawill be fetched by the Cognosanalyticaltool fordata analysis	IBM Cognos analytical tool
4.	Application Logic-3	The pre-trained Dashboards will be present to performanalysis on the incoming data	IBM Cognos analytical tool
5.	Database	Data will be retrieved from cloud	MySQL
6.	Cloud Database	Database Service on cloud	IBM DB2, IBM Cloud
7.	File Storage	Customer sales datais uploaded in cloud throughinterface	IBM Block Storageor Other Storage Service or Local Filesystem
8.	External API-1	To perform data analysis on the userdata	IBM Cognos Tool
9.	External API-2	To buildthe machine learning model for classification	Jupiter Notebook
10.	Machine Learning Model	To do the predictive analysis on the input data	Predictive analysis model,etc.
11.	Infrastructure (Server / Cloud)	ApplicationDeployment on LocalSystem / CloudLocal Server Configuration: Using the flask Cloud Server Configuration: IBM cloud	Local, Cloud Foundry

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Opensource framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g., SHA-256, Encryptions, IAM Controls, OWASPetc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Technology used
4.	Availability	Justify the availability of application (e.g.,use of loadbalancers, distributed servers etc.)	Technology used
5.	Performance	Design consideration for the performance of the application (number of requests per sec, useof Cache, use of CDN's) etc.	Technology used

ADVANTAGES AND DISADVANTAGES

Pro #1: Improvement in Demand Forecasting

Using artificial intelligence systems provides significant insight into forecasts, which is extremely valuable with supply chains. The technology will learn from

past data and then analyze that data to find predictable patterns. These key indicators are often what trigger demand, so they help suppliers stock products that customers want.

Pro #2: More Efficient Sourcing of Products

Data analytics uses past performance in combination with market pricing to approach the sourcing of products. In awards contracts based on predetermined metrics. Some supply chains look at price alone, while others have a broader criterion for sourcing.

Pro #3: Boost in Product Efficiency

Reducing overhead costs is an area where most businesses put most of their focus and for a good reason. When using supply chain analytics, data is gathered and analyzed to provide easily digestible assessments. Therefore, decision-makers can make slight modifications that reduce costs, improve the quality of products, and enhance the efficiency of all business processes.

Pro #4: Better Warehouse Management

Data analytics looks into the behavior of customers to ensure that products are being delivered in the most timely and profitable manner possible. In the past, supply chains relied on trial and error to maintain quality, but not analytics has taken away the guesswork. Reports can be produced automatically that show

leader any potential delays so they can make decisions accordingly.

Pro #5: Improved Logistics

Distribution and logistics are made much more efficient through the use of data processing because it enables businesses to share data in real-time. In addition to demand forecasting, this will help supply chains develop more efficient systems and uncover new delivery opportunities. Additionally, businesses can improve their asset uptime and better optimize resources.

Con 1: Deficiency in Future Predictions

While data is usually streamlined through the use of analytics, we have no way to predict the way humans will react on a given day. However, it's believed that data science can be adopted by HR departments to improve this accuracy, but the fact is that we'll never have a way to completely predict human behavior.

Con 2: Numbers can Create Uncertainty

One of the main problems with being data reliant is that there is still some uncertainty. While getting these decisions right will boost profits, second-guessing decisions can have a disastrous effect. Another cause of this can be poor data quality so developing proper data management practices is essential.

Con 3: Data Bias

Different departments within a company are going to be focused on specific metrics, which can cause them to be biased. Furthermore, data biases can also happen when people collecting the data already have a preconceived notion. Being biased is a natural human tendency, but it can be disastrous in business. It's avoided by making sure to ask the right questions. Let every department provide input before you decide on the questions to ask.

CONCLUSION

Since its arrival in the first edition of the DHL Logistics Trend Radar in 2013, Big Data Analytics has developed and today is increasingly becoming part of the *de-facto* operating model for the logistics industry. Surging demand for personalized and context-based services has driven development of artificial intelligence (AI) and machine learning applications which, in turn, have upped the need for larger datasets in the industry for better results.

Additionally, the rapid migration of enterprise data storage from traditional datacenters to the cloud has provided more flexibility in effectively scaling storage and processing power for all collected data. The need for visibility and prediction is ever-more pressing. COVID-19 has caused unprecedented

uncertainty in supply chains globally, affecting how goods are moved and altering consumer demand and behavior.

Big data analytics holds the key to uncovering hidden issues across entire supply chains and surfacing trends that are not so obvious. As companies around the world recover, demand is growing for promising features of data analytics, such as mitigating disaster risks, simulating operations, and improving customer service.

FUTURE SCOPE

Logistics is being transformed through the power of data-driven insights. Thanks to the vast degree of digital transformation and the Internet of Things, unprecedented amounts of data can be captured from various supply chain sources. Capitalizing on its value offers massive potential to increase operational efficiency, improve customer experience, reduce risk, and create new business models.

APPENDIX

GitHub link : https://github.com/IBM-EPBL/IBM-Project-51236-1660976324

Project Demo Link : https://vimeo.com/772537811

Team Details:

Team ID:	PNT2022TMID28822
Project ID:	IBM-Project-51236-1660976324
Team size:	4
Team Leader:	Nithish V
Team Members:	Narendra Prasath V
	Sathish S B
	Sriharikota Arun Kumar