Project Report

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| Qualification Name | Professional Diploma in Data Science |
| Module Name | WSQ - Data Science Modelling Project(SF) |

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| Project title | Data Science Modelling Project | | |

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| Learner declaration |
| I certify that the work submitted for this assignment is my own and research sources are fully acknowledged.    Student signature: Date: 24May2025 |

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**Document Version History**

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| **Version**  **Number** | **Effective Date of release** |  | **Details** | **Author** |
| 1.0 | 15 Nov 2024 | Initial Creation |  | Ismayil Siyad |
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1. Project Background

Brief summary of the project’s purpose and scope.

1. Project Objective

Enhance Customer Service

* Automate responses with Chatbot for automated question/answering.
* Provide quick and consistent support with loans application/approval using AI-driven solutions.
* Fraud detection. This aims to identify features and model to detect fraud a valuable insight that can be used to suggest

Improve Operational Efficiency

* Streamline email processing and task allocation using text analytics.
* Enable faster issue resolution with automated insights.
* Text analysis of customer reviews. This aims to understand customer sentiment, identify areas of improvement, and respond to customer feedback more effectively.

Strengthen Security

* Implement AI-powered image analysis and monitoring systems.
* Proactively detect and respond to potential threats.
* Image classification for vehicle identification. This classification will help automate identification of weapons and suspicious persons.

Empower Decision-Making

* Provide actionable insights through data-driven AI models.
* Enable staff to focus on complex, value-added tasks.

1. Project Specifications

1. Project Tasks

4a. Activity 1

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| Project Planning and Management |
| Identify the primary stakeholders and their needs.  Be specific about how the project addresses their challenges. |

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| User Persona Details |
| Audience: Describe the key users for the project.  Role: Define their position or responsibility.  Goals: Objectives that the project will help achieve.  Risk: Define their current risk and scope of risk control. |

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| Project Plan |
| * Milestones: Define major phases or deliverables * Tasks: Break milestones into specific tasks * Timeline: Include start and end dates for each task * Owner: Assign responsibility to individuals or teams * Priority: Use MoSCoW prioritization (Must-Have, Should-Have, Could-Have, Won’t-Have) * Status: Track progress (Not Started, In Progress, Completed) |

* Project proposal including project plan

4b. Activity 2

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| Develop a fraud detection model. |
| • Screenshot of the registered Tabular data asset |
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| • Screenshot of the Designer Pipeline |
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| • Evaluation Results of the model |
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| Explanations |
| Customer segmentation using KMeans clustering,  This journey of customer segmentation once implemented categorize customers into distinct groups based on shared characteristics, which supports personalized service delivery and targeted marketing efforts.  ABC Bank broader insights will capture nuance patterns in customer behavior.  Groups within customer data that could drive strategic business decisions.  Thus optimizing its marketing, product offerings, and customer engagement.  e & oe |

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| User Persona Details |
| A customer-centric services with enhanced customer insights will better understand and serve its diverse clientele.  Role: Define their position or responsibility.  Goals: Objectives that the project will help achieve. |

4c. Activity 3

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| Develop a loan predictor model in Azure. |
| • Screenshot of the registered Tabular data asset |
|  |
| Figure Data Information |
| Explorative Data Analysis (EDA) about the Loan.csv dataset |
| Figure Null and NA |
| Figure Data Head    Figure Data Tail    Figure Data Statistical summary |
| Figure Descriptive Statistic Figure Value of Risk |

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| --- | --- |
| • Screenshot of the best model performance of Loan Approval Prediction model  Job : shy\_bean\_bwrvks445g (BEST)  Model : cyan\_cheetah\_(2) | |
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| Visualization of the model metrics | |
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| Explanations |
| Financial institutions are subjected to fiduciary duty for safekeeping of customers assets. ABC Bank is not an exception at maintaining a base asset to meet regular banking commitments. This allows for excess to be reinvested to generate income for the banking business. The initial EDA of the Loan dataset indicates mean loan amount at $25,000 for the 20,000 customers in these few months of operation data. Below is the breakdown of <5,000 loan approval from the total loan available. The ABC bank is conservative with their credit analysis.  If the analysis model has been serving the business well, automating the process is the next milestone to increase performance. Azure Automated Machine Learning is capable of creating this model to keep up with the business. Circumstances will change in this fast-paced global environment. Maintaining liquidity in the business and controlling cashflow movement is very dynamic for banking environment. Which is why a fast and reliable model needs to be ready on a fly.    Statistically, the ABC Bank consumer loan market is to service the age group between 35 – 50 and 18 - 34 years old. From this group of applicants, the bank limits approval at 3k cases. Which means if they spend less time at processing and more time in finding better quality customers. The turnover will improve respectively.    Areas of improvements on the results to maintain accuracy and reliable performance. ABC Bank can generate new model with latest dataset information at the frequency of twice daily or when a new loan application is required. That way they have taken into account possible risk to the business. Models can easily be ingested into their online portal for quick in principal approval.    e & oe   |  | | --- | | User Persona Details | | Improving the speed of in-principal approval help sales and operations to operate more efficiently. With an automated model from Azure, the personnel in charge have better control of their work and the guidelines about the customer profile.  The ABC Bank still needs to put in place compliance system to have check and balance. Even quick sales marketing campaign can be created to meet short term target. | |

4d. Activity 4

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| Design a customer segmentation model |
| • Screenshot of the registered Tabular data asset |
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| • Screenshot of the Designer Pipeline |
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| • Evaluation Results of the clustering model | | |
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| *Sample of Json Assign cluster2* |  | |
| *Sample of Json Assign cluster0* |  | |
| Distribution of customers for each row in the assignment 0, 1 & 2 | | |
| Explanations | | |
| This is an unsupervised machine learning algorithm use in grouping data points having similar characteristics. The cluster output allocates one data to only one cluster. In soft decision clustering, the result provides the likelihood of data points to be in each set. In ABC Bank the 20,000-loan customer are clustered into points 0, 1 & 2.  This customer analysis identified the clustering place higher loan approval for assignment 1. With 8% from the overall 18% loan approval amount to $37,915K. Second in line is assignment 2 at 6% with amount of $27,516K. It will also useful to identify what makes up customers in assignment 0 with lowest loan approval and loan amount. As this could be a risk area to avoid or bias in decision making.    Areas of the results in assignment 1 & 2, analyzed with drill down data to show here demographic based on age and income. This shows higher rate of Approval are in ranges for ages in the 42, 40, 41, 47, 48, so forth.    e & oe   |  | | --- | | User Persona Details | | Marketing with product development is able to create better fit for the appropriate customer profiling using this clustering algorithm.  Credit department may want to explore giving credit for the other age group if the volume is substantial for the business. At the same time being aware of the higher risk and set better assessment to their credit conditions. | | | |

4e. Activity 5

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| Perform text classification for Industry trend and manage public perception |
| • Screenshot of the registered Tabular data asset  Extract of dataset in Annexure image e.5.0 |
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| • Screenshot of the Designer Pipeline |
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| • Evaluation Results of the model | |
| Multiclass Logistic Regression | MultiClass Boosted Decision Tree |
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| Explanations |
| This service uses TF-IDF which is term frequency-inverse document frequency as a statistical measure that evaluate the importance of a word in a document relative to a collection of documents (corpus). This combines two components the frequently a word appears and how unique or rare a word is across the corpus. This process includes converting text features into the numerical feature with feature extracting module n-gram from the text data. Then training the model. So, common words across many documents receive lower scores, while rare words receive higher scores. This ranks documents based on relevance to a user’s query.    Results from two models identify consistently that there are 1,500 unique features for the 6 category types. File from Json support this output with 3 samples tabulated below. These features with highest percentage show higher frequency of use. And they are found in different categories as well. Hence the list is focus on each one of the categories.  e & oe   |  | | --- | | User Persona Details | | This list works for both marketing and security. They can be use as keywords for SEO and product development campaigns. For security and operations, the features assist in improving services that is customer focus. For instance, to explain in more details about the investments or loan premiums and lock in periods. | |
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4f. Activity 6

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| Design and implement Azure AI Vision services image insights for marketing with API. | |
| • Created Resource: Azure AI Service Resource Setup, screenshot of the Azure AI service resource created in the Azure portal. | |
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| • Vision studio screenshot of the Azure AI services done on the images.  Enlarged images in Annexure f.6.0 |
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| • Analyzed Image and Analysis results  For this task the section is divided into the following categories |
| 6.1 Generate captions for activities in branch offices   * 1. Dense captioning for detailed activities   2. Tagging images for branch offices   3. Object detection for activities   4. Vision analysis through API.   5. Customizing object detection. |

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| • 6.1 Generate captions for activities in branch offices  Enlarged images in Annexure f.6.0 |
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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Name** | **Value.caption text** | **Value.confidence** | **True/False** | **Accuracy** | | img1.jpg | a man looking at multiple monitors | 73.28% | T | 100% | |  |  |  |  |  | | img2.jpg | a group of people in a bank | 74.79% | T | 50% | |  |  |  |  |  | | img3.jpg | a man standing in a bank | 77.68% | T | 50% | |  |  |  |  |  | | img4.jpg | a group of people in an office | 87.51% | T | 100% | |  |  |  |  |  | | img5.jpg | a bank vault with stacks of money | 64.65% | T | 100% | |  |  |  |  |  | | img6.jpg | a group of people in front of a building | 80.95% | T | 80% | |  |  |  |  |  | | img7.jpg | a group of people around a car crash | 74.74% | T | 80% | |  |  |  |  |  | | img8.jpg | a man sitting in front of computers | 71.14% | T | 80% | |  |  |  |  |  | | img9.jpg | a man standing at a counter with a woman standing behind him | 72.34% | T | 50% | |  |  |  |  |  | | img10.jpg | a group of people sitting at desks with screens and a large screen | 68.39% | T | 80% | |  |  |  |  |  | | img11.jpg | a group of people standing in a line | 83.94% | T | 50% | |  |  |  |  |  | | img12.jpg | a man receiving a certificate from a man at a podium | 72.87% | T | 80% | |  |  |  |  |  | | img13.jpg | a large crowd of people in a stadium | 71.47% | T | 80% | |  |  |  |  |  | | img14.jpg | a group of people sitting at tables reading newspaper | 78.03% | T | 80% | |  |  |  |  |  | | img15.jpg | a group of people in a building | 81.95% | T | 80% | | . |  |  |  |  | |

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| • 6.2 Dense captioning for detailed activities  Enlarged images in Annexure f.6.0 |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | the back of a man wearing a white shirt | 84.34% | T | 100% accurate descriptions  100% of captions are relevant to purpose of security | | a man wearing headphones | 81.88% | T | | a close up of a headphone | 78.82% | T | | a man wearing a headset | 73.99% | T | | a man looking at multiple monitors | 73.28% | T | | a man wearing a headset looking at a screen | 71.13% | T | | a man looking at a computer screen | 69.07% | T | | a screenshot of a video camera | 64.42% | T | | a group of images of a room | 62.81% | T | | a screen shot of a room | 60.54% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a close-up of a logo | 77.95% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a close up of a logo | 77.41% | T | | a close up of a television | 75.73% | T | | a group of people in a bank | 74.79% | T | | a keyboard on a table | 73.62% | T | | a close up of a screen | 73.44% | T | | a person holding a sword | 73.20% | T | | a blurry image of a television | 71.95% | T | | a man in a black jacket | 65.25% | T | | a small computer on a shelf | 63.87% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a blurry image of a man in a suit | 85.18% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a blurry image of a person's arm | 83.38% | T | | a plant in a pot | 79.03% | T | | a man standing in a bank | 77.68% | T | | a close-up of a sign | 76.86% | T | | a blurry image of a person standing at a desk | 75.15% | T | | a group of people standing in a line | 74.59% | T | | a man looking at the camera | 71.59% | T | | a person in blue jeans | 66.34% | T | | a metal pole with a sign on it | 64.88% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a group of people in an office | 87.51% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a man in a suit | 81.52% | T | | close-up of a sign | 80.77% | T | | a close-up of a drawer | 79.99% | T | | a man in a suit | 79.55% | T | | a white drawer with black handles | 76.82% | T | | a chair in front of a desk with multiple monitors | 72.59% | T | | a chair in an office | 68.36% | T | | a black office chair with a black seat | 65.30% | T | | a display of financial data on a wall | 63.03% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a blue sign with white text | 78.18% | T | 100% accurate descriptions  70% of captions are too general to use for security | | a close-up of a safe | 77.37% | T | | a green sign with white text | 77.28% | T | | a close-up of a bar | 76.57% | T | | a light shining on a tile floor | 70.17% | T | | a logo on a computer screen | 69.94% | F | | a shelf full of money | 66.59% | T | | a bank vault with stacks of money | 64.85% | T | | a bank vault with stacks of money | 64.66% | T | | a ceiling with grids and a hole in the ceiling | 63.90% | F |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a blurry image of a woman | 82.86% | F | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a group of people in front of a building | 80.95% | T | | a back view of a police officer | 79.64% | T | | a blurry image of a person's body | 75.67% | T | | a person in a suit | 75.46% | T | | a person in a police uniform | 73.55% | T | | a group of people in uniform | 71.90% | T | | a man in a uniform | 66.79% | T | | a white square sign with black text | 66.36% | F | | a person in a uniform | 63.63% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a close-up of a stop sign | 90.12% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a person wearing a safety vest | 81.23% | T | | a plant in a pot | 80.90% | T | | a red and white ambulance | 79.97% | F | | a man wearing a safety vest | 76.40% | T | | a group of people around a car crash | 74.74% | T | | a man holding a phone | 74.08% | T | | a white car with a damaged tail end | 72.07% | F | | a motorcycle accident on the road | 66.60% | T | | a car with a broken door | 65.28% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a hand on a keyboard | 86.36% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a close-up of a warning sign | 84.75% | T | | a close up of a phone | 83.17% | T | | a blurry hand holding a keyboard | 72.00% | T | | a man sitting in front of computers | 71.14% | T | | a man in a suit | 70.29% | T | | a tv with a man walking on it | 68.69% | T | | a red circle with a symbol in it | 67.75% | T | | a man using a computer | 65.80% | T | | a screen shot of a television | 64.81% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a blue circle with white letters | 90.34% | T | 100% accurate descriptions  70% of captions are uncertain to use for security. Activity of persons are inaccurate. | | a man in a suit | 87.60% | T | | a person holding a gun | 82.42% | T | | a close-up of a sign | 78.11% | T | | a person holding an umbrella and a camera | 76.95% | F | | a woman in a vest and tie standing next to a man | 72.63% | T | | a man standing at a counter with a woman standing behind him | 72.34% | F | | a brown object on a white background | 70.53% | T | | a keyboard on a table | 70.26% | T | | a pair of feet in black shoes | 66.48% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a close-up of a lock | 84.35% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a map of the world | 82.83% | T | | a person sitting in a chair | 82.01% | T | | a close-up of a chair | 80.00% | T | | a gold letter in a circle | 78.70% | T | | a man sitting at a desk looking at a computer screen | 76.65% | T | | a blurry image of a keyboard | 76.37% | T | | a close up of a motorcycle | 71.91% | F | | a group of people sitting at desks with screens and a large screen | 68.39% | T | | a person sitting at a desk with multiple screens | 67.98% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a close-up of a sign | 87.20% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a group of people standing in a line | 83.94% | T | | a person holding a piece of paper | 83.67% | T | | a group of people standing in a line | 79.81% | T | | a close up of a woman's skirt | 76.01% | T | | a man in a white shirt | 74.35% | T | | a man in a brown coat holding a paper | 72.50% | T | | a person with her hand in her pocket | 69.88% | T | | a person in a white shirt | 69.65% | T | | a woman wearing a dress | 66.95% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a man in a suit and tie | 81.99% | T | 90% accurate description  70% of captions are too general to use for security. Yet specific for marketing | | a statue of a man holding a stick | 81.00% | F | | a close-up of a red surface | 79.17% | F | | a close-up of a man in a suit clapping | 77.23% | T | | a close-up of a man holding a plaque | 75.79% | T | | a man receiving a certificate from a man at a podium | 72.87% | T | | a close-up of a couple of men holding a framed picture | 71.29% | T | | a black sign with white letters | 68.87% | T | | a person holding a framed certificate | 68.14% | T | | a man holding a plaque with a man in front of him | 66.75% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a blurry image of a football player running | 83.98% | T | 100% accurate descriptions  100% of captions are relevant for security and marketing | | a close up of a logo | 79.55% | T | | a crowd of people in a stadium | 78.94% | T | | a football player running on a field | 77.27% | T | | a large crowd of people watching a football game | 76.53% | T | | a blurry image of a logo | 75.19% | T | | a large crowd of people in a stadium | 71.47% | T | | a large screen with a football player running on it | 70.27% | T | | a lit up sign on a building | 67.29% | T | | a football game with referee and crowd | 57.82% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a close-up of a newspaper | 89.67% | T | 100% accurate descriptions  90% of captions are useful for security and marketing | | a blurry image of a person sitting at a table | 84.27% | T | | a blurry image of a chair | 80.04% | T | | a man reading a newspaper | 78.36% | T | | a group of people sitting at tables reading newspaper | 78.03% | T | | a cup of coffee with foam in it | 77.61% | T | | a glass of water on a table | 75.29% | T | | a glass of brown liquid | 72.96% | T | | a cup of coffee with a white foam in it | 72.91% | T | | a newspaper with a newspaper on it | 62.88% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Value.dense caption text** | **Value.confidence** | **TRUE/FALSE** | **Accuracy** | | a man in a suit | 83.57% | T | 100% accurate descriptions  70% of captions are too general to use for security. Yet specific for marketing | | a plant in a pot | 82.58% | T | | a group of people in a lobby | 81.97% | T | | a person carrying a red purse | 76.04% | T | | a window with a cross | 75.08% | T | | a person carrying a red bag | 74.72% | T | | a sign with white text | 71.66% | T | | a person in a suit | 71.56% | T | | a woman in a black skirt | 69.88% | T | | a grey round object on a carpet | 65.32% | T |   . |

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| • 6.3 Tagging images for branch offices  Enlarged images in Annexure f.6.0 |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure1** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 98.08% | T | | tagsResult | person | 97.46% | T | | tagsResult | man | 91.70% | T | | tagsResult | computer | 90.12% | T | | tagsResult | indoor | 84.93% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure2** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | text | 99.35% | T | | tagsResult | indoor | 98.03% | T | | tagsResult | computer | 97.84% | T | | tagsResult | clothing | 97.10% | T | | tagsResult | person | 88.13% | T | | tagsResult | man | 87.59% | T | | tagsResult | floor | 84.76% | T | | tagsResult | wall | 79.87% | T | | tagsResult | people | 58.82% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure3** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 99.87% | T | | tagsResult | person | 99.49% | T | | tagsResult | human face | 96.73% | T | | tagsResult | indoor | 93.96% | T | | tagsResult | jeans | 93.10% | T | | tagsResult | footwear | 89.64% | T | | tagsResult | man | 87.26% | T | | tagsResult | wall | 85.96% | T | | tagsResult | standing | 77.34% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure4** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | text | 99.87% | T | | tagsResult | furniture | 98.05% | T | | tagsResult | indoor | 96.61% | T | | tagsResult | computer | 95.80% | T | | tagsResult | clothing | 95.59% | T | | tagsResult | office building | 94.32% | T | | tagsResult | man | 93.17% | T | | tagsResult | table | 90.49% | T | | tagsResult | computer monitor | 88.84% | T | | tagsResult | chair | 87.00% | T | | tagsResult | office chair | 86.47% | T | | tagsResult | person | 82.86% | T | | tagsResult | desk | 82.67% | T | | tagsResult | floor | 78.40% | T | | tagsResult | office | 62.08% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure5** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | text | 98.00% | T | | tagsResult | indoor | 80.03% | T | | tagsResult | door | 65.44% | T | | tagsResult | ground | 60.70% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure6** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 99.54% | T | | tagsResult | building | 99.49% | T | | tagsResult | man | 99.37% | T | | tagsResult | footwear | 97.35% | T | | tagsResult | text | 95.60% | T | | tagsResult | outdoor | 94.80% | T | | tagsResult | person | 93.93% | T | | tagsResult | trousers | 89.93% | T | | tagsResult | people | 81.99% | T | | tagsResult | officer | 71.67% | T | | tagsResult | standing | 69.04% | T | | tagsResult | street | 61.80% | T | | tagsResult | city | 58.41% | T | | tagsResult | shop | 57.02% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure7** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | vehicle | 99.53% | T | | tagsResult | land vehicle | 99.23% | T | | tagsResult | car | 98.35% | T | | tagsResult | wheel | 98.12% | T | | tagsResult | outdoor | 96.21% | T | | tagsResult | text | 95.47% | T | | tagsResult | building | 95.23% | T | | tagsResult | footwear | 94.00% | T | | tagsResult | person | 87.62% | T | | tagsResult | clothing | 86.17% | T | | tagsResult | traffic | 84.33% | T | | tagsResult | people | 76.83% | T | | tagsResult | street | 70.51% | T | | tagsResult | city | 67.68% | T | | tagsResult | parked | 54.29% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure8** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | text | 96.51% | T | | tagsResult | clothing | 94.54% | T | | tagsResult | indoor | 94.37% | T | | tagsResult | man | 94.04% | T | | tagsResult | person | 82.07% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure9** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 99.82% | T | | tagsResult | computer | 99.09% | T | | tagsResult | person | 98.83% | T | | tagsResult | indoor | 98.48% | T | | tagsResult | desk | 96.49% | T | | tagsResult | office building | 95.50% | T | | tagsResult | text | 92.24% | T | | tagsResult | wall | 90.62% | T | | tagsResult | job | 90.48% | T | | tagsResult | man | 89.15% | T | | tagsResult | laptop | 88.93% | T | | tagsResult | personal computer | 87.80% | T | | tagsResult | employment | 86.16% | T | | tagsResult | furniture | 84.37% | T | | tagsResult | standing | 72.25% | T | | tagsResult | people | 63.40% | T | | tagsResult | floor | 62.12% | T | | tagsResult | office | 41.14% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure10** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | furniture | 98.41% | T | | tagsResult | chair | 97.26% | T | | tagsResult | table | 96.43% | T | | tagsResult | indoor | 96.01% | T | | tagsResult | text | 94.88% | T | | tagsResult | coffee table | 85.11% | F | | tagsResult | floor | 77.35% | T | | tagsResult | library | 67.33% | F | | tagsResult | room | 62.73% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure11** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 99.77% | T | | tagsResult | footwear | 98.54% | T | | tagsResult | person | 98.27% | T | | tagsResult | man | 96.14% | T | | tagsResult | people | 95.54% | T | | tagsResult | indoor | 94.13% | T | | tagsResult | group | 90.46% | T | | tagsResult | cleanliness | 85.35% | T | | tagsResult | standing | 74.66% | T | | tagsResult | floor | 70.06% | T | | tagsResult | crowd | 67.07% | T | | tagsResult | line | 64.25% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure12** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 99.85% | T | | tagsResult | man | 99.27% | T | | tagsResult | suit | 98.47% | T | | tagsResult | person | 98.06% | T | | tagsResult | indoor | 95.06% | T | | tagsResult | footwear | 94.15% | T | | tagsResult | carpet | 85.46% | T | | tagsResult | woman | 85.27% | T | | tagsResult | people | 84.26% | T | | tagsResult | wall | 77.74% | T | | tagsResult | group | 69.75% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure13** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | sport venue | 98.10% | T | | tagsResult | arena | 97.52% | T | | tagsResult | player | 95.19% | T | | tagsResult | artificial turf | 93.69% | T | | tagsResult | fan | 93.45% | T | | tagsResult | person | 92.79% | T | | tagsResult | team sport | 91.79% | T | | tagsResult | ball game | 89.40% | T | | tagsResult | text | 88.74% | T | | tagsResult | game | 88.48% | T | | tagsResult | scoreboard | 87.97% | T | | tagsResult | outdoor | 87.80% | T | | tagsResult | multi-sport event | 85.68% | T | | tagsResult | grass | 81.43% | T | | tagsResult | stadium | 77.77% | T | | tagsResult | people | 76.92% | T | | tagsResult | group | 71.72% | T | | tagsResult | crowd | 60.54% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure14** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | tableware | 93.71% | T | | tagsResult | table | 93.01% | T | | tagsResult | indoor | 92.88% | T | | tagsResult | man | 91.59% | T | | tagsResult | furniture | 91.06% | T | | tagsResult | newspaper | 90.83% | T | | tagsResult | clothing | 90.04% | T | | tagsResult | coffee cup | 89.20% | T | | tagsResult | saucer | 87.58% | T | | tagsResult | book | 85.87% | T | | tagsResult | person | 85.60% | T | | tagsResult | coffee | 84.99% | T | | tagsResult | people | 82.85% | T | | tagsResult | sitting | 79.05% | T | | tagsResult | text | 66.35% | T | | tagsResult | reading | 62.22% | T | | tagsResult | cafe | 44.39% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure15** | **Value.values.name** | **Value.values.confidence** | **TRUE/FALSE** | | tagsResult | clothing | 99.89% | T | | tagsResult | footwear | 99.70% | T | | tagsResult | man | 98.87% | T | | tagsResult | person | 98.46% | T | | tagsResult | building | 98.02% | T | | tagsResult | jeans | 96.48% | T | | tagsResult | people | 96.24% | T | | tagsResult | woman | 95.68% | T | | tagsResult | furniture | 94.76% | T | | tagsResult | coffee table | 85.17% | T | | tagsResult | text | 84.89% | T | | tagsResult | group | 81.92% | T | | tagsResult | ground | 71.21% | T | | tagsResult | indoor | 70.55% | T | | tagsResult | standing | 69.57% | T | | tagsResult | outdoor | 57.71% | F | | tagsResult | floor | 56.73% | T |   . |

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| • 6.4 Object detection for activities  Enlarged images in Annexure f.6.0 |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure1** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 89.60% | T | | objectsResult | television | 64.40% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure2** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 87.60% | T | | objectsResult | person | 82.60% | T | | objectsResult | person | 55.00% | T | | objectsResult | computer keyboard | 54.00% | T | | objectsResult | television | 53.90% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure3** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 89.70% | T | | objectsResult | person | 84.80% | T | | objectsResult | person | 79.20% | T | | objectsResult | person | 63.40% | T | | objectsResult | potted plant | 57.90% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure4** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | chair | 86.40% | T | | objectsResult | person | 85.90% | T | | objectsResult | person | 75.80% | T | | objectsResult | chair | 73.90% | T | | objectsResult | person | 59.80% | T | | objectsResult | person | 59.00% | T | | objectsResult | person | 53.80% | T |   . |
| |  |  |  | | --- | --- | --- | | **Figure5** | **Value.values** | **TRUE/FALSE** | | objectsResult | NA | F |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure6** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 87.20% | T | | objectsResult | person | 86.10% | T | | objectsResult | person | 82.40% | T | | objectsResult | person | 77.40% | T | | objectsResult | person | 55.20% | T | | objectsResult | person | 54.90% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure7** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 87.40% | T | | objectsResult | Land vehicle | 84.70% | T | | objectsResult | motorcycle | 67.90% | T | | objectsResult | person | 67.10% | T | | objectsResult | person | 64.70% | T | | objectsResult | car | 63.60% | T | | objectsResult | person | 63.20% | T | | objectsResult | car | 61.70% | T | | objectsResult | person | 58.00% | T | | objectsResult | person | 54.70% | T | | objectsResult | Land vehicle | 50.40% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure8** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 79.30% | T | | objectsResult | person | 76.10% | T | | objectsResult | television | 72.50% | T | | objectsResult | person | 66.20% | T | | objectsResult | person | 59.80% | T | | objectsResult | display | 52.50% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure9** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 90.60% | T | | objectsResult | person | 85.00% | T | | objectsResult | person | 80.50% | T | | objectsResult | television | 72.30% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure10** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | chair | 79.10% | T | | objectsResult | chair | 74.30% | T | | objectsResult | chair | 63.30% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure11** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 78.80% | T | | objectsResult | person | 77.00% | T | | objectsResult | person | 75.40% | T | | objectsResult | person | 74.90% | T | | objectsResult | person | 71.80% | T | | objectsResult | person | 62.80% | T | | objectsResult | person | 59.60% | T | | objectsResult | person | 58.90% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure12** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 83.90% | T | | objectsResult | person | 83.20% | T | | objectsResult | person | 73.70% | T | | objectsResult | person | 70.50% | T | | objectsResult | person | 65.70% | T | | objectsResult | person | 65.40% | T | | objectsResult | person | 63.70% | T | | objectsResult | person | 62.40% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure13** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 62.60% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure14** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 84.30% | T | | objectsResult | dining table | 81.60% | T | | objectsResult | person | 79.80% | T | | objectsResult | cup | 76.10% | T | | objectsResult | cup | 67.80% | T | | objectsResult | cup | 58.30% | T | | objectsResult | cup | 58.20% | T | | objectsResult | plant | 55.20% | T | | objectsResult | person | 54.80% | T |   . |
| |  |  |  |  | | --- | --- | --- | --- | | **Figure15** | **Value.values.tags.name** | **Value.values.tags.confidence** | **TRUE/FALSE** | | objectsResult | person | 78.80% | T | | objectsResult | person | 78.40% | T | | objectsResult | person | 76.90% | T | | objectsResult | person | 61.70% | T | | objectsResult | person | 60.50% | T |   . |

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| • 6.5 Vision analysis through API  Enlarged images in Annexure f.6.0  JSON file in Annexure 9. f.6.0 |
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| |  |  |  | | --- | --- | --- | | **Postman output** | **Value.text** | **Value.confidence** | | captionResult | a man standing in a bank | 77.68% | | denseCaptionsResult | a man standing in a bank | 77.68% | | denseCaptionsResult | a man looking at the camera | 71.59% | | denseCaptionsResult | a person in blue jeans | 66.34% | | denseCaptionsResult | a blurry image of a person standing at a desk | 75.15% | | denseCaptionsResult | a plant in a pot | 79.03% | | denseCaptionsResult | a close-up of a sign | 76.86% | | denseCaptionsResult | a blurry image of a man in a suit | 85.18% | | denseCaptionsResult | a blurry image of a person's arm | 83.38% | | denseCaptionsResult | a group of people standing in a line | 74.57% | | denseCaptionsResult | a metal pole with a sign on it | 64.92% | | tagsResult | clothing | 99.87% | | tagsResult | person | 99.49% | | tagsResult | human face | 96.73% | | tagsResult | indoor | 93.96% | | tagsResult | jeans | 93.10% | | tagsResult | footwear | 89.64% | | tagsResult | man | 87.26% | | tagsResult | wall | 85.96% | | tagsResult | standing | 77.34% | | objectsResult | potted plant | 57.90% | | objectsResult | person | 79.20% | | objectsResult | person | 63.40% | | objectsResult | person | 84.80% | | objectsResult | person | 89.70% | | peopleResult |  | 94.70% | | peopleResult |  | 94.13% | | peopleResult |  | 87.56% | | peopleResult |  | 85.93% | | peopleResult |  | 0.22% | | peopleResult |  | 0.15% | | peopleResult |  | 0.15% | | peopleResult |  | 0.13% | |

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| • 6.6 Customizing object detection |
| With capabilities of the API as demonstrated in above section 6.5. All the features of Vision analysis showcase in a single image are summarized for Figure image3. The results from features of single caption generation, dense captioning, tagging of images, and object detections are listed in one document. This is convenient for output extraction and linking to other system from the JSON file.  This image caption generation offers real time descriptions to images that are collected from various facilities. Along with dense captioning to indicate the environment in the image. Tagging identifies the physical presence and general layout in the space. And object detection makes a physical count of them. There are shortcomings in the system that can be further trained. As all the features replaces the need for active human visual inspections. So, locations that is of low urgency and high traffic can be assign appropriate surveillance measures.  Besides for use of security, visuals descriptions are also a means to keep marketing informed of their publication materials that are published. The tractions from viewers and effectiveness of their campaigns. |

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| Explanations |
| This service in Azure is the image recognition with text description algorithm. It is designed to analyze the image area and provide descriptions. Be it with caption, dense captioning, tagging of images and object detections. The scanned image JSON files will indicate the scene, signage, living and decorative features. This system is also able to count and differentiate images from display terminals.  If the features are used to monitor marketing campaign and want machine to detect if the posters are changed or its positioning. This tool can do so automatically along with head count the number of eyeballs it captures. In any national level campaign event, more resources can be activated promptly if public response becomes overwhelming. The detection of potential security incidents faster is an indispensable tool when many branches are spread over many locations.  The goal is still to provide real-time insights that contribute to a safer banking environment. Areas of improvements on the results from the examples are in accuracy and score performance.  // e & oe |

4g. Activity 7

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| Utilize Azure AI Vision services for face images analysis. |
| • Created Resource and Vision Studio |
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| • Vision studio screenshots  Enlarged images in Annexure g.7.0 |
| |  |  |  | | --- | --- | --- | |  |  | people (1).jpg | | Faces identified |  | 5 | | TRUE |  | 5T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 5 | | Accuracy |  | 100% |     Figure FaceP1   |  |  |  | | --- | --- | --- | |  |  | people (2).jpg | | Faces identified |  | 6 | | TRUE |  | 6T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 6 | | Accuracy |  | 90% |     Figure FaceP2   |  |  |  | | --- | --- | --- | |  |  | people (3).jpg | | Faces identified |  | 2 | | TRUE |  | 1T | | FALSE |  | 1F | | WithMask |  | 0 | | NoMask |  | 1 | | Accuracy |  | 90% |      |  |  |  | | --- | --- | --- | |  |  | people (4).jpg | | Faces identified |  | 12 | | TRUE |  | 12T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 12 | | Accuracy |  | 100% |   Figure FaceP3    Figure FaceP4   |  |  |  | | --- | --- | --- | |  |  | people (5).jpg | | Faces identified |  | 4 | | TRUE |  | 4T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 4 | | Accuracy |  | 100% |     Figure FaceP5   |  |  |  | | --- | --- | --- | |  |  | people (6).jpg | | Faces identified |  | 10 | | TRUE |  | 8T | | FALSE |  | 2F | | WithMask |  | 0 | | NoMask |  | 8 | | Accuracy |  | 90% |     Figure FaceP6   |  |  |  | | --- | --- | --- | |  |  | people (7).jpg | | Faces identified |  | 3 | | TRUE |  | 3T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 3 | | Accuracy |  | 100% |     Figure FaceP7   |  |  |  | | --- | --- | --- | |  |  | people (8).jpg | | Faces identified |  | 3 | | TRUE |  | 3T | | FALSE |  | 1F | | WithMask |  | 0 | | NoMask |  | 4 | | Accuracy |  | 90% |     Figure FaceP8   |  |  |  | | --- | --- | --- | |  |  | people (9).jpg | | Faces identified |  | 11 | | TRUE |  | 11T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 11 | | Accuracy |  | 90% |     Figure FaceP9   |  |  |  | | --- | --- | --- | |  |  | people (10).jpg | | Faces identified |  | 2 | | TRUE |  | 2T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 2 | | Accuracy |  | 100% |     Figure FaceP10   |  |  |  | | --- | --- | --- | |  |  | people (11).jpg | | Faces identified |  | 8 | | TRUE |  | 8T | | FALSE |  | 2F | | WithMask |  | 0 | | NoMask |  | 8 | | Accuracy |  | 90% |     Figure FaceP11   |  |  |  | | --- | --- | --- | |  |  | people (12).jpg | | Faces identified |  | 4 | | TRUE |  | 4T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 4 | | Accuracy |  | 100% |     Figure FaceP12   |  |  |  | | --- | --- | --- | |  |  | people (13).jpg | | Faces identified |  | 3 | | TRUE |  | 3T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 3 | | Accuracy |  | 100% |     Figure FaceP13   |  |  |  | | --- | --- | --- | |  |  | people (14).jpg | | Faces identified |  | 39 | | TRUE |  | 39T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 39 | | Accuracy |  | 100% |     Figure FaceP14   |  |  |  | | --- | --- | --- | |  |  | people (15).jpg | | Faces identified |  | 3 | | TRUE |  | 3T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 3 | | Accuracy |  | 100% |     Figure FaceP15   |  |  |  | | --- | --- | --- | |  |  | people (16).jpg | | Faces identified |  | 2 | | TRUE |  | 2T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 2 | | Accuracy |  | 100% |     Figure FaceP16   |  |  |  | | --- | --- | --- | |  |  | people (17).jpg | | Faces identified |  | 2 | | TRUE |  | 2T | | FALSE |  | 0T | | WithMask |  | 0 | | NoMask |  | 2 | | Accuracy |  | 100% |     Figure FaceP17   |  |  |  | | --- | --- | --- | |  |  | people (18).jpg | | Faces identified |  | 3 | | TRUE |  | 3T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 3 | | Accuracy |  | 100% |     Figure FaceP18   |  |  |  | | --- | --- | --- | |  |  | people (19).jpg | | Faces identified |  | 11 | | TRUE |  | 11T | | FALSE |  | 0F | | WithMask |  | 0 | | NoMask |  | 11 | | Accuracy |  | 90% |     Figure FaceP19   |  |  |  | | --- | --- | --- | |  |  | people (20).jpg | | Faces identified |  | 1 | | TRUE |  | 1T | | FALSE |  | 0F | | WithMask |  | 1 | | NoMask |  | 0 | | Accuracy |  | 100% |     Figure FaceP20   |  |  |  | | --- | --- | --- | |  |  | people (21).jpg | | Faces identified |  | 2 | | TRUE |  | 2T | | FALSE |  | 0F | | WithMask |  | 2 | | NoMask |  | 0 | | Accuracy |  | 100% |     Figure FaceP21   |  |  |  | | --- | --- | --- | |  |  | people (22).jpg | | Faces identified |  | 4 | | TRUE |  | 4T | | FALSE |  | 0F | | WithMask |  | 4 | | NoMask |  | 0 | | Accuracy |  | 90% |      |  |  |  | | --- | --- | --- | |  |  | people (23).jpg | | Faces identified |  | 1 | | TRUE |  | 1T | | FALSE |  | 0F | | WithMask |  | 1 | | NoMask |  | 0 | | Accuracy |  | 100% |   Figure FaceP22    *Figure FaceP23* |

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| • Analyzed Face Images and Analysis results |
| |  |  |  |  | | --- | --- | --- | --- | | **Face Images** | **Attribute** | **Value** | **Accuracy** | | Faces identified | people (1).jpg | 5 | 100% | | Faces identified | people (2).jpg | 6 | 90% | | Faces identified | people (3).jpg | 2 | 90% | | Faces identified | people (4).jpg | 12 | 100% | | Faces identified | people (5).jpg | 4 | 100% | | Faces identified | people (6).jpg | 10 | 90% | | Faces identified | people (7).jpg | 3 | 100% | | Faces identified | people (8).jpg | 3 | 90% | | Faces identified | people (9).jpg | 11 | 90% | | Faces identified | people (10).jpg | 2 | 100% | | Faces identified | people (11).jpg | 8 | 90% | | Faces identified | people (12).jpg | 4 | 100% | | Faces identified | people (13).jpg | 3 | 100% | | Faces identified | people (14).jpg | 39 | 100% | | Faces identified | people (15).jpg | 3 | 100% | | Faces identified | people (16).jpg | 2 | 100% | | Faces identified | people (17).jpg | 2 | 100% | | Faces identified | people (18).jpg | 3 | 100% | | Faces identified | people (19).jpg | 11 | 90% | | Faces identified | people (20).jpg | 1 | 100% | | Faces identified | people (21).jpg | 2 | 100% | | Faces identified | people (22).jpg | 4 | 90% | | Faces identified | people (23).jpg | 1 | 100% | |

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| Explanations  JSON file in Annexure 9. g.7.0 |
| This service in Azure is the face image recognition algorithm. It is designed to analyze the features of faces, The scanned image JSON files will indicate within the bounding boxes features of the model. Below is a script example from image P20 of a child. Notice how the measurements are recorded and labeled. This system recognize face from eye hole socket, nose and mouth position in proportion to the overall layout.    Face Image performance is accurate from the analysis provided for counting presence of faces or images with face features including heads with or without bodies. Which is why the analysis with 90% shows heads on its own. This tool is useful to automatically do a head count the number of heads in a premises at a given time. Its performance will also depend on the quality of images provided for analysis. Even faces at the background was recognized as a facial on a head in the crowd.  [  {  "recognitionModel": "recognition\_01",  "faceRectangle": {  "width": 539,  "height": 657,  "left": 403,  "top": 126  },  "faceLandmarks": {  "pupilLeft": {  "x": 550,  "y": 403.8  },  "pupilRight": {  "x": 809.2,  "y": 417.8  }, |
| User Persona Details |
| Marketing, operation and security:  For ABC Bank to manage sustainable operations of multiple branches in different locations, one immediate concern is about adequate allocation of resources. At times events will draw in large crowds to the premises that pose security issues. With more manpower resources this also incur higher backend services to upkeep security compliance and integrity. This face image recognition algorithm function as an added scanner to existing security camera features for the bank.  ABC Bank can enhance branch security with AI-driven face detection solutions. Azure Vision Studio enables real-time monitoring of customer activity, helping security teams ensure a safe and responsive environment. These are some ways the solution helps the bank.  -Use of face recognition systems in bank activities  -Recognize potential security incidents  -Provide actionable insights about persons to security personnel for prompt responses  Role and goal:  The guidelines for banking secrecy are still upheld. This tool is to assist the bank retail management identify overcrowding in premises. With this information, security or additional personnel can be activated to the scene. For instance, at a kiosk location when faces identified exceeded a reasonable number, the enforcement patrol gets activated.  Even though officers are given face credentials identifiers like access card. This face image identification can identify the ratio of personnel to customer ratio for an event to be executed more effectively. Otherwise missed opportunity will only increases marketing cost when prospect in person presence is not given attention.  For monitoring of secured facilities like banking customer safe and physical assets storage. This face image identification can keep records of activities. Besides the person count, it also detects if customers are being poached by unethical personnel on duty. The image footage is useful for securing the bank integrity position.  Although this service is constrained to only capture facial features, personal data regulation requires proper storage and accountability on its application. The image detection service would be adequate in some circumstances. For instance, to manage movement detection and if accuracy of faces credentials is not demanded.  // e & oe |

4h. Activity 8

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| --- |
| Implement an Optical Character Recognition (OCR) system to extract text from handwritten documents. |
| • Created Resource |
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| --- |
| • Vision studio screenshot  Enlarged images in Annexure h.8.0 |
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| --- | --- |
| • Analysed OCR Images and Analysis results  Enlarged images in Annexure h.8.0 | |
|  | |  |  | | --- | --- | | **Value.words.text** | **Value.words.confidence** | | CHEMIN | 98.90% | | PRIVÉ | 98.90% | | PASSAGE | 99.30% | | INTERDIT | 95.90% |   Accuracy 100% |
|  | |  |  | | --- | --- | | **Value.words.text** | **Value.words.confidence** | | make | 98.80% | | things | 85.50% | | happen | 97.50% |   Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | |  |  | | --- | --- | | **Value.words.text** | **Value.words.confidence** | | What's | 89.40% | | NEXT | 98.40% |   Accuracy 100% |
|  | Accuracy 100% |
|  | |  |  | | --- | --- | | **Value.words.text** | **Value.words.confidence** | | FRAGILE | 99.30% |   Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |
|  | Accuracy 100% |

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| Explanations |
| This service in Azure is the image processing for OCR technology. It is designed to analyze the text from images, ensuring quick and accurate data digitalization. With traditional data entry being time-consuming and prone to human error. This technology starts image analysis once from the first capture. Thus, effectively use resources to process large volume of information from various sources. The automation of text extractions reduces manual data entry errors and improve processing time. It also archives periodically for future referencing.  OCR technology performance is accurate from the analysis provided using the dataset of ABC Bank. It also recognizes different language by offering the breakdown of texts. The images are not limited to typed or handwritten formatting, it can be taken directly from objects or off the wall in any alignment. This is usually the case when information is captured within time and space constrains. Even in dark background or limited lighted environment.  Results example shows 100% accuracy for Latin alphabets. This score performance may vary with different language characters. Depending on operations of ABC Bank, this OCR technology will have to be customized if geographic operations require them.  e & oe |

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| User Persona Details |
| Role: Additional data reviewers will be required depending on the value of transactions.  Goals: To optimize the first level of data entry processing time. |

4i. Activity 9

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| --- |
| Design and implement image classification system for security with API. |
| • Created Resource |
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| --- |
| • Custom vision portal screenshot |
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| --- |
| • Evaluation results of the model after training |
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| --- |
| • Tested results |
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| • API response from Postman |
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| --- |
| Explanations |
| Evaluation of usefulness of this service.  Areas of improvements on the results example accuracy and score performance. |

|  |
| --- |
| User Persona Details |
| Audience: Describe the key users for the project.  Role: Define their position or responsibility.  Goals: Objectives that the project will help achieve. |

4j. Activity 10

|  |
| --- |
| Implement Language service cognitive for text analytics on customer reviews emails. |
| • Created Resource |
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| • Language portal screenshot |
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| --- |
| • Analysis results |
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| --- |
| Explanations |
| Evaluation of usefulness of this service.  Areas of improvements on the results example accuracy and score performance. |

|  |
| --- |
| User Persona Details |
| Audience: Describe the key users for the project.  Role: Define their position or responsibility.  Goals: Objectives that the project will help achieve. |

4k. Activity 11

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| --- |
| Develop Language Service for customer automated question/answering. |
| • Created Language Resource |
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| • Language portal screenshot |
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| --- |
| • Knowledge Base Screenshot |
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| --- |
| • Test Results |
|  |

|  |
| --- |
| Explanations |
| Evaluation of usefulness of this service.  Areas of improvements on the results example accuracy and score performance. |

|  |
| --- |
| User Persona Details |
| Audience: Describe the key users for the project.  Role: Define their position or responsibility.  Goals: Objectives that the project will help achieve. |

4l. Activity 12

|  |
| --- |
| Design and implement a FAQ chatbot. |
| • Created Language Resource |
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| • Language portal screenshot |
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| --- |
| • Intents, Entities, Utterances Screenshot |
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| --- |
| • Training Results |
|  |

|  |
| --- |
| • Test Results |
|  |

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| --- |
| Explanations |
| Evaluation of usefulness of this service.  Areas of improvements on the results example accuracy and score performance. |

|  |
| --- |
| User Persona Details |
| Audience: Describe the key users for the project.  Role: Define their position or responsibility.  Goals: Objectives that the project will help achieve. |

1. Annexure

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| --- |
| * 1. **[Link: Learning on Demand\_ sign in](https://learnondemandsystemsb2c.b2clogin.com/learnondemandsystemsb2c.onmicrosoft.com/b2c_1a_signup_signin_tms/oauth2/v2.0/authorize?client_id=c602a47c-ab93-480b-ac8d-cccf54c59797&redirect_uri=https%3A%2F%2Flms.learnondemand.net%2FAuthenticationProvider%2FOwinCallback&response_type=id_token&scope=openid%20profile%20email&state=OpenIdConnect.AuthenticationProperties%3DivL20ttogkfSiEz60M-cKu6Z_1WNfMNHQv4sbnfj-eXomiEgIuoXNA_moM8Sldc3n7DS9YucI2bIp_KPKOYn_UTL0D7zdYmX6dGOc42BZg94JCmKPfc3rXhpkgCEKvu1iKd8PP1Ynl5bP9q6gdha8hMQM2Kl3RdgYaYzTdUG1wLyCbPvqAvJtPZy9EM1LDUrs8XH6riFefJhoWvqZw_BIsiB797xPOB8qLJH4yhMKKSh3R4McOINZVYYfaTowVuF9TdnLc_A_yAffi71GOmHGLG6NI-05KBkS0dlaEhjHG-rBRqc&response_mode=form_post&nonce=638751801215559643.NmRkNWNmNWItNzIwMi00YmFjLWFiZWYtNWRmZDVkYzc5YzFmNTQ5MjdjMjQtZmE4Zi00MzY4LWI2NTctODhkNWJjNjgzYzhm&ui=tms&x-client-SKU=ID_NET472&x-client-ver=7.0.3.0)** |
| https://learnondemandsystemsb2c.b2clogin.com/learnondemandsystemsb2c.onmicrosoft.com/b2c\_1a\_signup\_signin\_tms/oauth2/v2.0/authorize?client\_id=c602a47c-ab93-480b-ac8d-cccf54c59797&redirect\_uri=https%3A%2F%2Flms.learnondemand.net%2FAuthenticationProvider%2FOwinCallback&response\_type=id\_token&scope=openid%20profile%20email&state=OpenIdConnect.AuthenticationProperties%3DivL20ttogkfSiEz60M-cKu6Z\_1WNfMNHQv4sbnfj-eXomiEgIuoXNA\_moM8Sldc3n7DS9YucI2bIp\_KPKOYn\_UTL0D7zdYmX6dGOc42BZg94JCmKPfc3rXhpkgCEKvu1iKd8PP1Ynl5bP9q6gdha8hMQM2Kl3RdgYaYzTdUG1wLyCbPvqAvJtPZy9EM1LDUrs8XH6riFefJhoWvqZw\_BIsiB797xPOB8qLJH4yhMKKSh3R4McOINZVYYfaTowVuF9TdnLc\_A\_yAffi71GOmHGLG6NI-05KBkS0dlaEhjHG-rBRqc&response\_mode=form\_post&nonce=638751801215559643.NmRkNWNmNWItNzIwMi00YmFjLWFiZWYtNWRmZDVkYzc5YzFmNTQ5MjdjMjQtZmE4Zi00MzY4LWI2NTctODhkNWJjNjgzYzhm&ui=tms&x-client-SKU=ID\_NET472&x-client-ver=7.0.3.0 |

1. Images

|  |
| --- |
| Extract of the abc\_bank\_news\_dataset Activity e.5.0 |
|  |

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| --- |
| • Vision studio screenshot of the Azure AI services done on the images.  Enlarged images from Activity f.6.0 |
| Figure image1    Figure image2    Figure image3    Figure image4    Figure image5    Figure image6    Figure image7    Figure image8    Figure image9    Figure image10    Figure image11    Figure image12    Figure image13    Figure image14    Figure image15 |

|  |
| --- |
| • Vision studio screenshot of the Azure AI services done on the images.  Enlarged images from Activity g.7.0 |
| Figure FaceP1    Figure FaceP2    Figure FaceP3    Figure FaceP4    Figure FaceP5    Figure FaceP6    Figure FaceP7    Figure FaceP8    Figure FaceP9    Figure FaceP10    Figure FaceP11    Figure FaceP12    Figure FaceP13    Figure FaceP14    Figure FaceP15    Figure FaceP16    Figure FaceP17    Figure FaceP18    Figure FaceP19    Figure FaceP20    Figure FaceP21    Figure FaceP22    Figure FaceP23 |
| • Vision studio screenshot of the Azure AI services done on the images.  Enlarged images from Activity h.8.0 |
| Figure OCR1    Figure OCR2a    Figure OCR2b    Figure OCR3    Figure OCR4    Figure OCR5    Figure OCR6    Figure OCR7    Figure OCR8    Figure OCR9    Figure OCR10    Figure OCR11    Figure OCR12    Figure OCR13    Figure OCR14 |

1. JSON FILES

|  |
| --- |
| **JSON file for Annexure 9. f.6.0** |
| |  | | --- | | { | | "modelVersion": "2023-10-01", | | "captionResult": { | | "text": "a man standing in a bank", | | "confidence": 0.7767596244812012 | | }, | | "denseCaptionsResult": { | | "values": [ | | { | | "text": "a man standing in a bank", | | "confidence": 0.7767596244812012, | | "boundingBox": { | | "x": 0, | | "y": 0, | | "w": 1024, | | "h": 1024 | | } | | }, | | { | | "text": "a man looking at the camera", | | "confidence": 0.715904951095581, | | "boundingBox": { | | "x": 544, | | "y": 0, | | "w": 460, | | "h": 1001 | | } | | }, | | { | | "text": "a person in blue jeans", | | "confidence": 0.6634309887886047, | | "boundingBox": { | | "x": 0, | | "y": 393, | | "w": 136, | | "h": 554 | | } | | }, | | { | | "text": "a blurry image of a person standing at a desk", | | "confidence": 0.7515058517456055, | | "boundingBox": { | | "x": 192, | | "y": 392, | | "w": 140, | | "h": 388 | | } | | }, | | { | | "text": "a plant in a pot", | | "confidence": 0.7903368473052979, | | "boundingBox": { | | "x": 450, | | "y": 429, | | "w": 91, | | "h": 202 | | } | | }, | | { | | "text": "a close-up of a sign", | | "confidence": 0.7685977816581726, | | "boundingBox": { | | "x": 353, | | "y": 232, | | "w": 199, | | "h": 136 | | } | | }, | | { | | "text": "a blurry image of a man in a suit", | | "confidence": 0.851833164691925, | | "boundingBox": { | | "x": 333, | | "y": 394, | | "w": 87, | | "h": 316 | | } | | }, | | { | | "text": "a blurry image of a person's arm", | | "confidence": 0.8337739109992981, | | "boundingBox": { | | "x": 0, | | "y": 481, | | "w": 86, | | "h": 176 | | } | | }, | | { | | "text": "a group of people standing in a line", | | "confidence": 0.7457073926925659, | | "boundingBox": { | | "x": 0, | | "y": 576, | | "w": 661, | | "h": 438 | | } | | }, | | { | | "text": "a metal pole with a sign on it", | | "confidence": 0.6491613984107971, | | "boundingBox": { | | "x": 468, | | "y": 659, | | "w": 114, | | "h": 302 | | } | | } | | ] | | }, | | "metadata": { | | "width": 1024, | | "height": 1024 | | }, | | "tagsResult": { | | "values": [ | | { | | "name": "clothing", | | "confidence": 0.9987287521362305 | | }, | | { | | "name": "person", | | "confidence": 0.9948886036872864 | | }, | | { | | "name": "human face", | | "confidence": 0.9673390984535217 | | }, | | { | | "name": "indoor", | | "confidence": 0.9396439790725708 | | }, | | { | | "name": "jeans", | | "confidence": 0.9309995174407959 | | }, | | { | | "name": "footwear", | | "confidence": 0.8963714838027954 | | }, | | { | | "name": "man", | | "confidence": 0.8725972175598145 | | }, | | { | | "name": "wall", | | "confidence": 0.859596848487854 | | }, | | { | | "name": "standing", | | "confidence": 0.7733779549598694 | | } | | ] | | }, | | "objectsResult": { | | "values": [ | | { | | "boundingBox": { | | "x": 458, | | "y": 438, | | "w": 83, | | "h": 188 | | }, | | "tags": [ | | { | | "name": "potted plant", | | "confidence": 0.579 | | } | | ] | | }, | | { | | "boundingBox": { | | "x": 226, | | "y": 401, | | "w": 111, | | "h": 376 | | }, | | "tags": [ | | { | | "name": "person", | | "confidence": 0.792 | | } | | ] | | }, | | { | | "boundingBox": { | | "x": 329, | | "y": 403, | | "w": 89, | | "h": 321 | | }, | | "tags": [ | | { | | "name": "person", | | "confidence": 0.634 | | } | | ] | | }, | | { | | "boundingBox": { | | "x": 3, | | "y": 405, | | "w": 130, | | "h": 542 | | }, | | "tags": [ | | { | | "name": "person", | | "confidence": 0.848 | | } | | ] | | }, | | { | | "boundingBox": { | | "x": 507, | | "y": 5, | | "w": 517, | | "h": 1019 | | }, | | "tags": [ | | { | | "name": "person", | | "confidence": 0.897 | | } | | ] | | } | | ] | | }, | | "readResult": { | | "blocks": [ | | { | | "lines": [ | | { | | "text": "ABC", | | "boundingPolygon": [ | | { | | "x": 66, | | "y": 227 | | }, | | { | | "x": 150, | | "y": 246 | | }, | | { | | "x": 140, | | "y": 299 | | }, | | { | | "x": 58, | | "y": 283 | | } | | ], | | "words": [ | | { | | "text": "ABC", | | "boundingPolygon": [ | | { | | "x": 73, | | "y": 228 | | }, | | { | | "x": 150, | | "y": 244 | | }, | | { | | "x": 138, | | "y": 300 | | }, | | { | | "x": 61, | | "y": 284 | | } | | ], | | "confidence": 0.994 | | } | | ] | | }, | | { | | "text": "ABC", | | "boundingPolygon": [ | | { | | "x": 374, | | "y": 255 | | }, | | { | | "x": 536, | | "y": 254 | | }, | | { | | "x": 536, | | "y": 311 | | }, | | { | | "x": 373, | | "y": 311 | | } | | ], | | "words": [ | | { | | "text": "ABC", | | "boundingPolygon": [ | | { | | "x": 380, | | "y": 254 | | }, | | { | | "x": 512, | | "y": 254 | | }, | | { | | "x": 513, | | "y": 311 | | }, | | { | | "x": 381, | | "y": 311 | | } | | ], | | "confidence": 0.994 | | } | | ] | | }, | | { | | "text": "BANK", | | "boundingPolygon": [ | | { | | "x": 374, | | "y": 312 | | }, | | { | | "x": 539, | | "y": 312 | | }, | | { | | "x": 539, | | "y": 358 | | }, | | { | | "x": 374, | | "y": 358 | | } | | ], | | "words": [ | | { | | "text": "BANK", | | "boundingPolygon": [ | | { | | "x": 375, | | "y": 312 | | }, | | { | | "x": 526, | | "y": 313 | | }, | | { | | "x": 525, | | "y": 359 | | }, | | { | | "x": 374, | | "y": 359 | | } | | ], | | "confidence": 0.992 | | } | | ] | | }, | | { | | "text": "ABC BANK", | | "boundingPolygon": [ | | { | | "x": 93, | | "y": 380 | | }, | | { | | "x": 206, | | "y": 380 | | }, | | { | | "x": 205, | | "y": 419 | | }, | | { | | "x": 92, | | "y": 417 | | } | | ], | | "words": [ | | { | | "text": "ABC", | | "boundingPolygon": [ | | { | | "x": 92, | | "y": 380 | | }, | | { | | "x": 139, | | "y": 380 | | }, | | { | | "x": 138, | | "y": 418 | | }, | | { | | "x": 92, | | "y": 418 | | } | | ], | | "confidence": 0.959 | | }, | | { | | "text": "BANK", | | "boundingPolygon": [ | | { | | "x": 147, | | "y": 380 | | }, | | { | | "x": 204, | | "y": 380 | | }, | | { | | "x": 203, | | "y": 419 | | }, | | { | | "x": 146, | | "y": 418 | | } | | ], | | "confidence": 0.99 | | } | | ] | | }, | | { | | "text": "ABC BANK", | | "boundingPolygon": [ | | { | | "x": 115, | | "y": 624 | | }, | | { | | "x": 234, | | "y": 587 | | }, | | { | | "x": 246, | | "y": 627 | | }, | | { | | "x": 126, | | "y": 666 | | } | | ], | | "words": [ | | { | | "text": "ABC", | | "boundingPolygon": [ | | { | | "x": 123, | | "y": 621 | | }, | | { | | "x": 164, | | "y": 608 | | }, | | { | | "x": 177, | | "y": 649 | | }, | | { | | "x": 136, | | "y": 662 | | } | | ], | | "confidence": 0.99 | | }, | | { | | "text": "BANK", | | "boundingPolygon": [ | | { | | "x": 172, | | "y": 605 | | }, | | { | | "x": 232, | | "y": 587 | | }, | | { | | "x": 245, | | "y": 627 | | }, | | { | | "x": 185, | | "y": 646 | | } | | ], | | "confidence": 0.977 | | } | | ] | | } | | ] | | } | | ] | | }, | | "smartCropsResult": { | | "values": [ | | { | | "aspectRatio": 1.13, | | "boundingBox": { | | "x": 14, | | "y": 43, | | "w": 967, | | "h": 853 | | } | | } | | ] | | }, | | "peopleResult": { | | "values": [ | | { | | "boundingBox": { | | "x": 557, | | "y": 7, | | "w": 465, | | "h": 1015 | | }, | | "confidence": 0.9470229148864746 | | }, | | { | | "boundingBox": { | | "x": 0, | | "y": 399, | | "w": 138, | | "h": 550 | | }, | | "confidence": 0.9412882328033447 | | }, | | { | | "boundingBox": { | | "x": 332, | | "y": 400, | | "w": 86, | | "h": 312 | | }, | | "confidence": 0.8756301999092102 | | }, | | { | | "boundingBox": { | | "x": 199, | | "y": 399, | | "w": 136, | | "h": 384 | | }, | | "confidence": 0.859340488910675 | | }, | | { | | "boundingBox": { | | "x": 598, | | "y": 413, | | "w": 389, | | "h": 257 | | }, | | "confidence": 0.0021701978985220194 | | }, | | { | | "boundingBox": { | | "x": 0, | | "y": 447, | | "w": 12, | | "h": 117 | | }, | | "confidence": 0.001530365669168532 | | }, | | { | | "boundingBox": { | | "x": 0, | | "y": 396, | | "w": 41, | | "h": 549 | | }, | | "confidence": 0.0014951503835618496 | | }, | | { | | "boundingBox": { | | "x": 200, | | "y": 507, | | "w": 133, | | "h": 152 | | }, | | "confidence": 0.0013226462760940194 | | } | | ] | | } | | } | |
| **JSON file for Annexure 9. g.7.0** |
| [  {  "recognitionModel": "recognition\_01",  "faceRectangle": {  "width": 539,  "height": 657,  "left": 403,  "top": 126  },  "faceLandmarks": {  "pupilLeft": {  "x": 550,  "y": 403.8  },  "pupilRight": {  "x": 809.2,  "y": 417.8  },  "noseTip": {  "x": 681.8,  "y": 543.2  },  "mouthLeft": {  "x": 565.4,  "y": 642.3  },  "mouthRight": {  "x": 767,  "y": 653.4  },  "eyebrowLeftOuter": {  "x": 462.6,  "y": 332.3  },  "eyebrowLeftInner": {  "x": 617.2,  "y": 337.1  },  "eyeLeftOuter": {  "x": 501.8,  "y": 400.5  },  "eyeLeftTop": {  "x": 555.6,  "y": 381.9  },  "eyeLeftBottom": {  "x": 543.6,  "y": 423.2  },  "eyeLeftInner": {  "x": 599.1,  "y": 409.8  },  "eyebrowRightInner": {  "x": 753.1,  "y": 348.5  },  "eyebrowRightOuter": {  "x": 901.3,  "y": 361.9  },  "eyeRightInner": {  "x": 762.6,  "y": 421.7  },  "eyeRightTop": {  "x": 807.1,  "y": 393.5  },  "eyeRightBottom": {  "x": 810.3,  "y": 437  },  "eyeRightOuter": {  "x": 856.7,  "y": 419.1  },  "noseRootLeft": {  "x": 645.9,  "y": 424.9  },  "noseRootRight": {  "x": 716.8,  "y": 427.3  },  "noseLeftAlarTop": {  "x": 627.4,  "y": 506.1  },  "noseRightAlarTop": {  "x": 729.8,  "y": 509.9  },  "noseLeftAlarOutTip": {  "x": 603.1,  "y": 549.1  },  "noseRightAlarOutTip": {  "x": 746.7,  "y": 558.5  },  "upperLipTop": {  "x": 674.8,  "y": 632.3  },  "upperLipBottom": {  "x": 669.2,  "y": 649.5  },  "underLipTop": {  "x": 667.2,  "y": 671.1  },  "underLipBottom": {  "x": 666,  "y": 701.4  }  },  "faceAttributes": {  "mask": {  "type": "faceMask",  "noseAndMouthCovered": true  }  }  }  ] |