

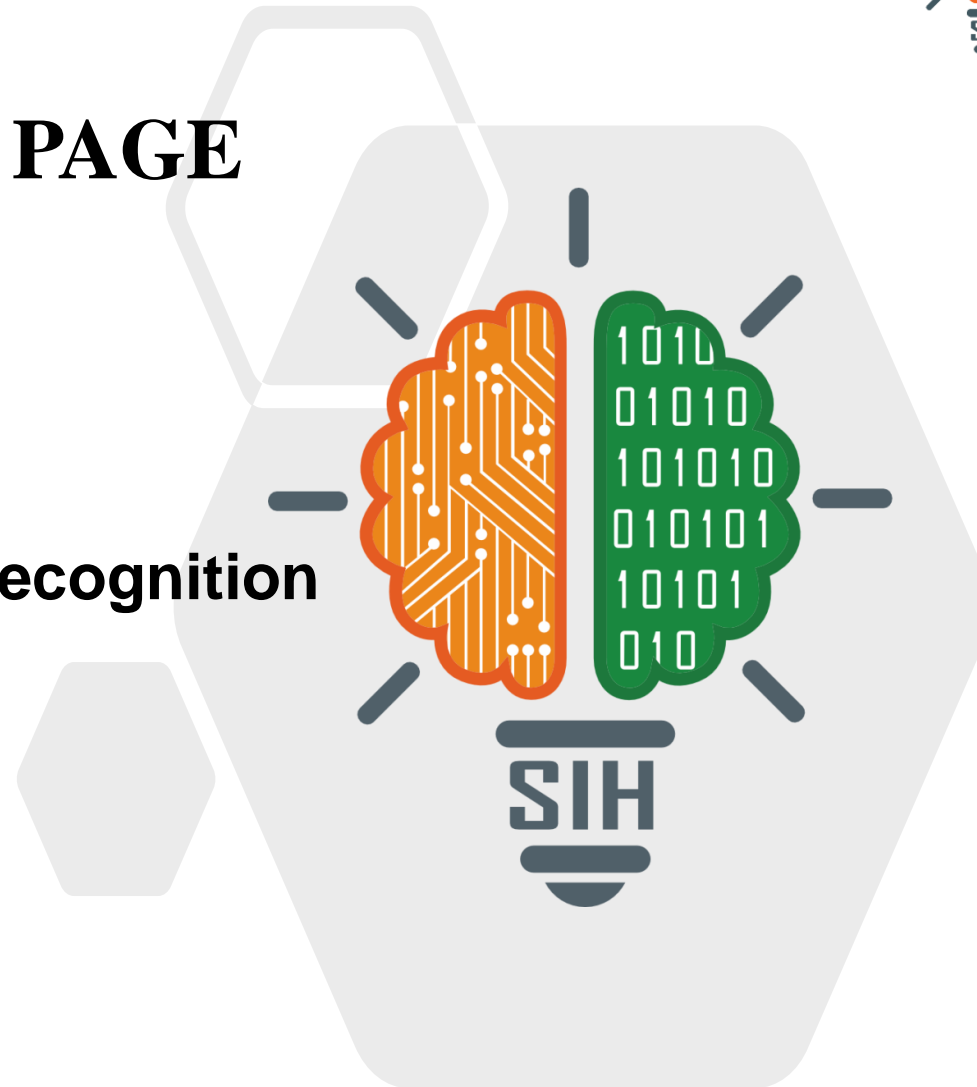
SMART INDIA HACKATHON 2024



SMART INDIA
HACKATHON
2024

TITLE PAGE

- 1604
- Solution : Conversational Image Recognition Chatbot
- Theme - Smart Automation
- PS Category- Software
- Team Name : Code Crafters



IDEA TITLE

❖ Image Recognition Chatbot (using CNN, Transfer Learning, RNN)

- **Image Recognition Module :**
 - Utilize deep learning-based computer vision (CNN, RNN, etc.) to recognize objects in images
 - Train models using ImageNet
- **NLP Module**
 - Employ NLP techniques (tokenization, entity recognition, sentiment analysis, etc.) to understand user queries
 - Integrate with Image Recognition Module to generate relevant responses
- **Chatbot Module**
 - Design conversational interface using Django and JavaScript- Integrate Image Recognition and NLP Modules to generate responses
- **Database**
 - Store user queries, image recognition results, and chatbot responses
 - Use database to improve chatbot's understanding and response accuracy

- **1. Image Recognition Module**
 - Use CNNs (ImageNet) for object detection and recognition customer supporting bot
 - After it, other NLP based multi Chatbot agents will be activated and they will started to reply it
 - framework: PyTorch- Image Processing:, OpenCV
- **2. NLP Module**
 - Text Processing: NLTK for Sentiment Analysis and give customer support according uploaded image and asked quesrtions
 - Text-Image Correlation: similarity metrics (cosine similarity)
- **3. Chatbot Module**
 - Frontend: React- Backend: Django, Django REST Framework
 - APIs integrate image recognition and NLP modules
- **4. Database-**
 - Relational Database (SQLITE/MySQL)
 - Store user queries, recognized objects, and chatbot responses
 - Continuously improve accuracy through feedback loops

Monthly plan without our solution : (
₹1,16,000 - ₹1,77,000)

3. Minimum Rupees Estimate for ImageNet + MetaAI 3.1	
Here's a rough cost estimate based on the increased resource requirements:	
Component	Monthly Cost (INR)
GPU (NVIDIA A100)	₹1,00,000 - ₹1,50,000
CPU (16-core)	₹10,000 - ₹15,000
RAM (64-128 GB)	₹5,000 - ₹10,000
SSD Storage (1 TB)	₹1,000 - ₹2,000
Total	₹1,16,000 - ₹1,77,000

Monthly plan with our solution : (₹27,500 -
₹45,000)

3. Minimum Rupees Estimate	
For 100 concurrent users in 1 minute, you'll need a GPU-based server to handle the image classification requests effectively. Here's a rough estimate:	
Component	Monthly Cost (INR)
GPU (NVIDIA T4)	₹20,000 - ₹30,000
CPU (8-core)	₹5,000 - ₹10,000
RAM (16 GB)	₹2,000 - ₹4,000
SSD Storage (200 GB)	₹500 - ₹1,000
Total	₹27,500 - ₹45,000

With the help of our solution we can save about **14,40,000 Rs** per months appox, due to creating NLP module from scratch without fine tuning

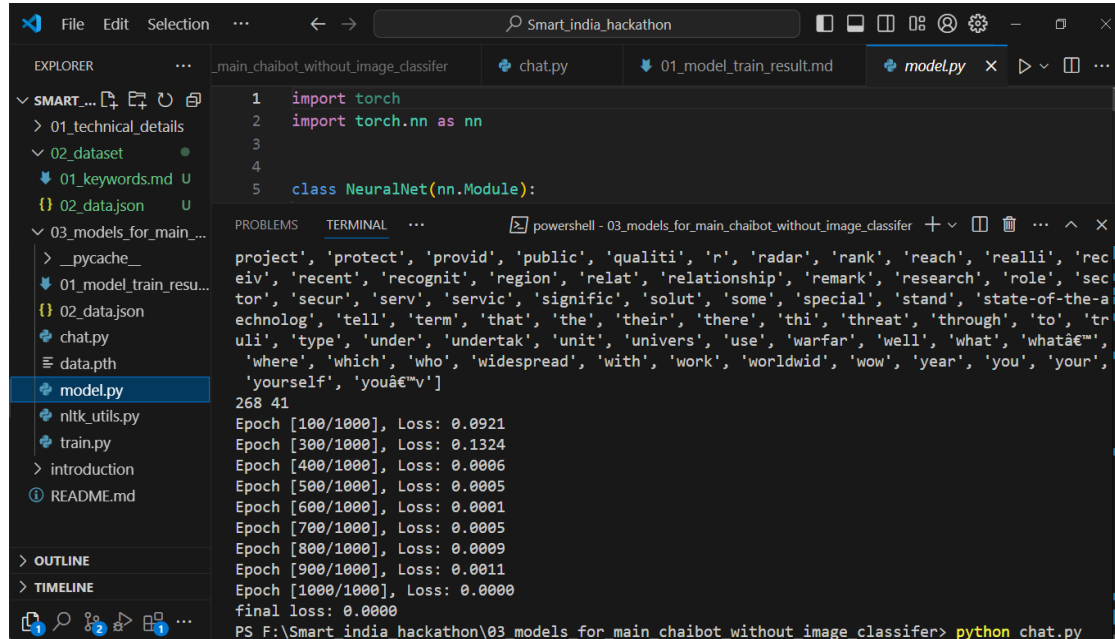


- **Benefits for BEL1 :**
 - **Streamlined Operations:** Automate image processing, reduce manual intervention, and enhance workflows.
 - **Improved Security:** Real-time threat detection, quick decision making, and enhanced surveillance.
 - **Enhanced Customer Support:** Automated equipment diagnostics, real-time assistance, and improved customer satisfaction.
 - **Training and Maintenance:** Visual training aid, proactive maintenance, and improved equipment reliability.
- **Impact on BEL Customers1 :**
 - **Faster Issue Resolution:** Quick diagnosis, efficient support, and reduced downtime.
 - **Enhanced Product Security:** Product integrity, surveillance feedback, and quality assurance.
 - **Improved User Experience:** Ease of use, 24/7 assistance, and continuous support.
 - **Real-Time Monitoring:** Critical infrastructure monitoring, added layer of defense, and national security.
- **Long-Term Strategic Impact :**
 - **Scalability:** Expand applications in various sectors.
 - **Data-Driven Insights:** Improve products, optimize support, and enhance operational efficiency.
 - **National Security:** Bolster national security initiatives with advanced image recognition and NLP capabilities.

Code
crafters

CURRENT PROGRESS & REFERENCES

Accuracy of our current main model is 99.9994% 😊



```

1 import torch
2 import torch.nn as nn
3
4
5 class NeuralNet(nn.Module):
6     def __init__(self):
7         super(NeuralNet, self).__init__()
8         self.fc1 = nn.Linear(1000, 1000)
9         self.fc2 = nn.Linear(1000, 1000)
10        self.fc3 = nn.Linear(1000, 1000)
11        self.relu = nn.ReLU()
12
13    def forward(self, x):
14        x = self.fc1(x)
15        x = self.relu(x)
16        x = self.fc2(x)
17        x = self.relu(x)
18        x = self.fc3(x)
19        return x
20
21    def train(self, train_loader, dev_loader):
22        for epoch in range(1000):
23            train_loss, dev_loss = self.train_epoch(train_loader, dev_loader)
24            print(f'Epoch [{epoch}/1000], Loss: {train_loss} {dev_loss}')
25
26        final_loss = self.train_epoch(train_loader, dev_loader)
27        print(f'final loss: {final_loss}')
28
29    def train_epoch(self, train_loader, dev_loader):
30        train_loss = 0
31        dev_loss = 0
32        for data, target in train_loader:
33            output = self.forward(data)
34            loss = self.criterion(output, target)
35            train_loss += loss.item()
36
37        for data, target in dev_loader:
38            output = self.forward(data)
39            loss = self.criterion(output, target)
40            dev_loss += loss.item()
41
42        return train_loss / len(train_loader), dev_loss / len(dev_loader)
43
44    def test(self, test_loader):
45        test_loss = 0
46        for data, target in test_loader:
47            output = self.forward(data)
48            loss = self.criterion(output, target)
49            test_loss += loss.item()
50
51        return test_loss / len(test_loader)
52
53    def train(self):
54        train_loader = torch.utils.data.DataLoader(train_data_loader_data)
55        dev_loader = torch.utils.data.DataLoader(dev_data_loader_data)
56        test_loader = torch.utils.data.DataLoader(test_data_loader_data)
57
58        self.train(train_loader, dev_loader)
59        test_loss = self.test(test_loader)
60        print(f'test loss: {test_loss}')
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62    def __repr__(self):
63        return 'NeuralNet()'
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65    def __str__(self):
66        return 'NeuralNet()'
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