



KAVACH 2023



LDRP - ITR



KSV

# ADVANCED ANPR and FRS SOLUTION

Team Name: Coding Brigades

Problem statement: KVH-005

# Team Details

**Team Name: Coding Brigades**

Team no: 5



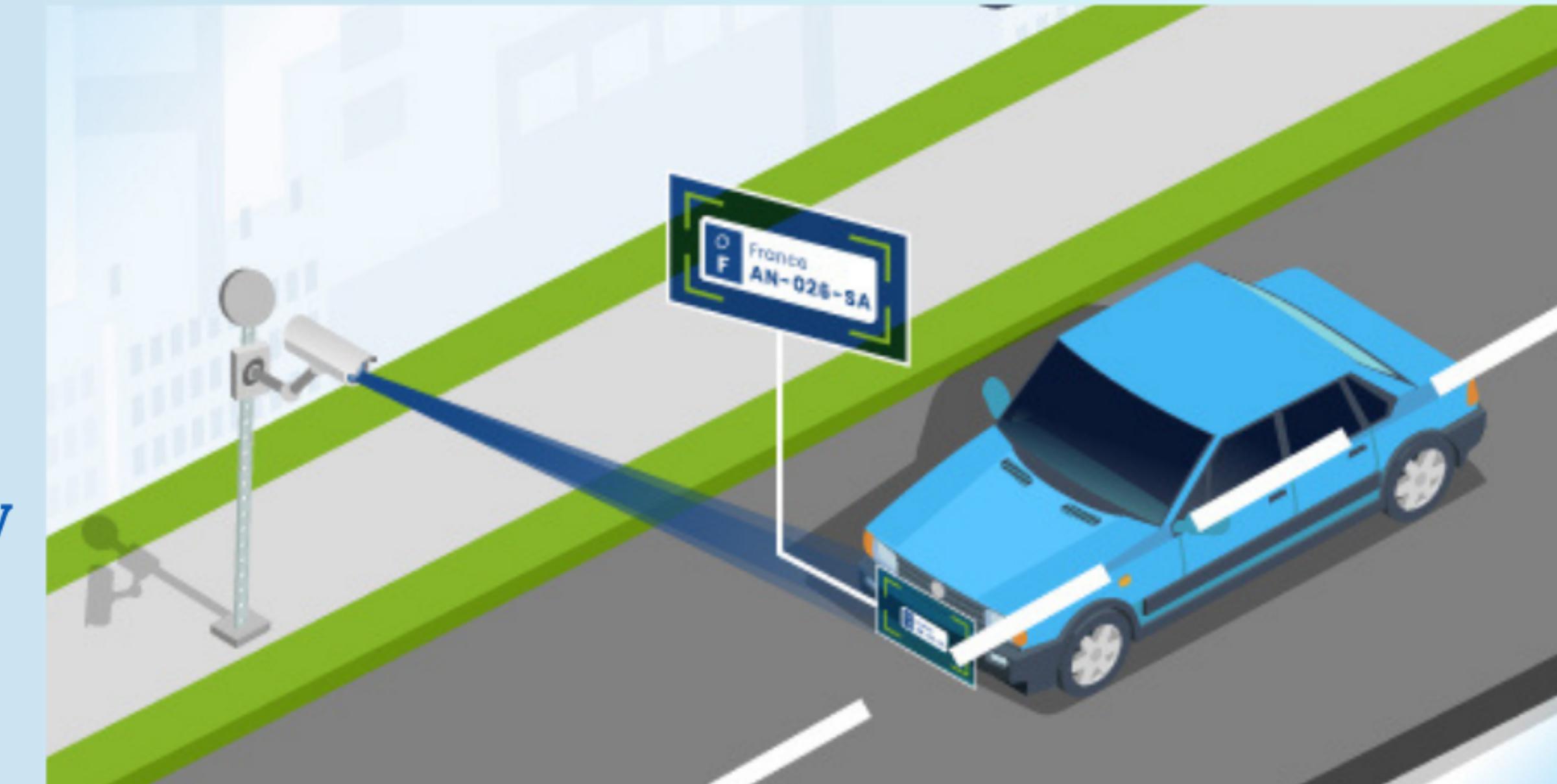
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# Problem Statement

<b>PS ID:</b>	KVH-005
<b>Title of PS:</b>	Advanced ANPR and FRS solution
<b>Domain Bucket:</b>	Video analytics/CCTV
<b>Description:</b>	<p>Design and develop a technological solution that can accurately perform the Automatic Number Plate Recognition (ANPR) along with Facial Recognition from the available CCTV feeds. The solution should be able to recognize number plates that are written in typical non-standard ways using varying font styles, sizes, designs, symbols, languages etc., i.e. difficult to recognize by existing ANPR Systems.</p>

# Automatic Number Plate Recognition (ANPR)

- ANPR system is widely used for security and surveillance purposes.
- ANPR system is revolutionising the way we gather data, identify vehicles, and generate electronic challans.



# Loopholes in existing system

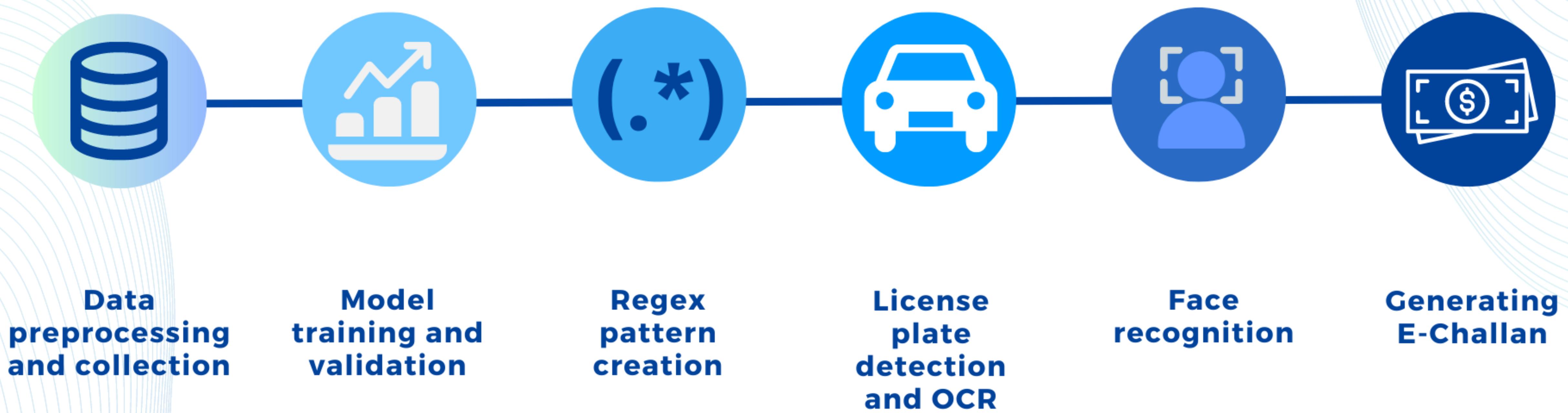
- **License plate variety:** India has 50+ license plate\* types with unique styles, colors, fonts, and sizes.
- **Unauthorised access to the data or stealing of data.**



- **Hand-painted plates:** Hand-painted license plates which is difficult to decode.
- Some ANPR systems have difficulty recognising **dirty or obscured license plates.**
- ANPR is **unable to determine the drivers' identity.**



# DEVELOPMENT OF SOLUTION



# Data Collection & Preparation

We captured and prepared the data manually needed to develop an accurate and effective ANPR system.



- **Various sources:** include CCTV feeds, college campus parking lots, and housing complex feeds.
  - ie. College campus, parking lot
- **Different lighting conditions:** to account for brightness, contrast, and shadow variations.
  - ie. Dusk and Dawn, Night vision cams, etc.
- **Multiple cameras:** to capture different angles and perspectives of license plates.
- **Diversification:** Collect data from a diverse range of license plate types, including non-standard plates with unique styles, colours, fonts, and sizes.



# STRATEGIC ANALYSIS

## Strengths

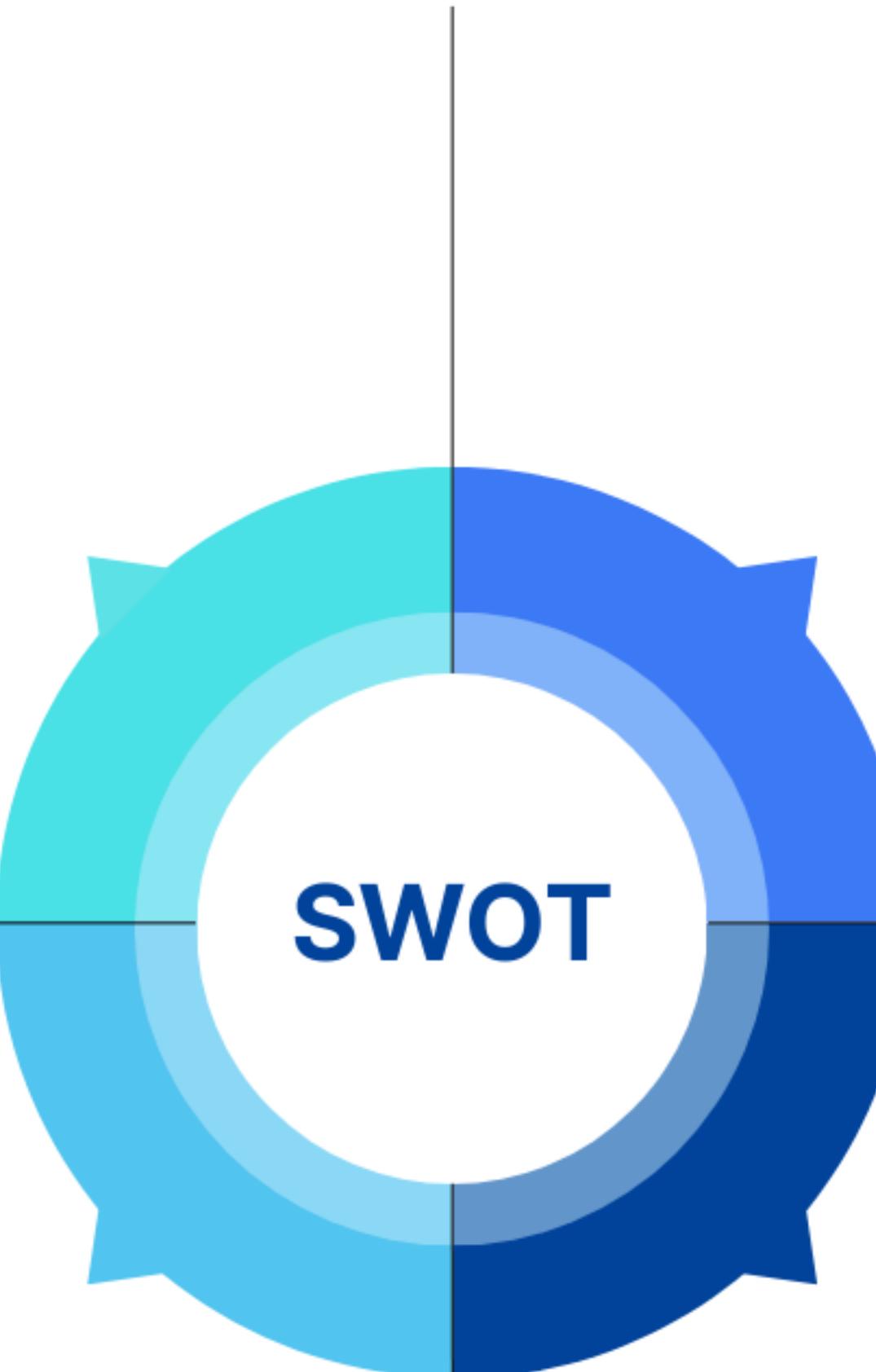
- **Accuracy:** provides accurate data by assuring face recognition
- **Time efficiency and scalability:** ANPR provides time efficiency than manual checking and is also highly scalable
- **E-Challan:** enabling efficient and accurate enforcement actions.
- **Law enforcement:** providing traffic data and detecting traffic violations
- **Improved security:** monitoring public spaces for safety.
- **Facilitates the search for the real culprit**
- **Better governance**

## Opportunities

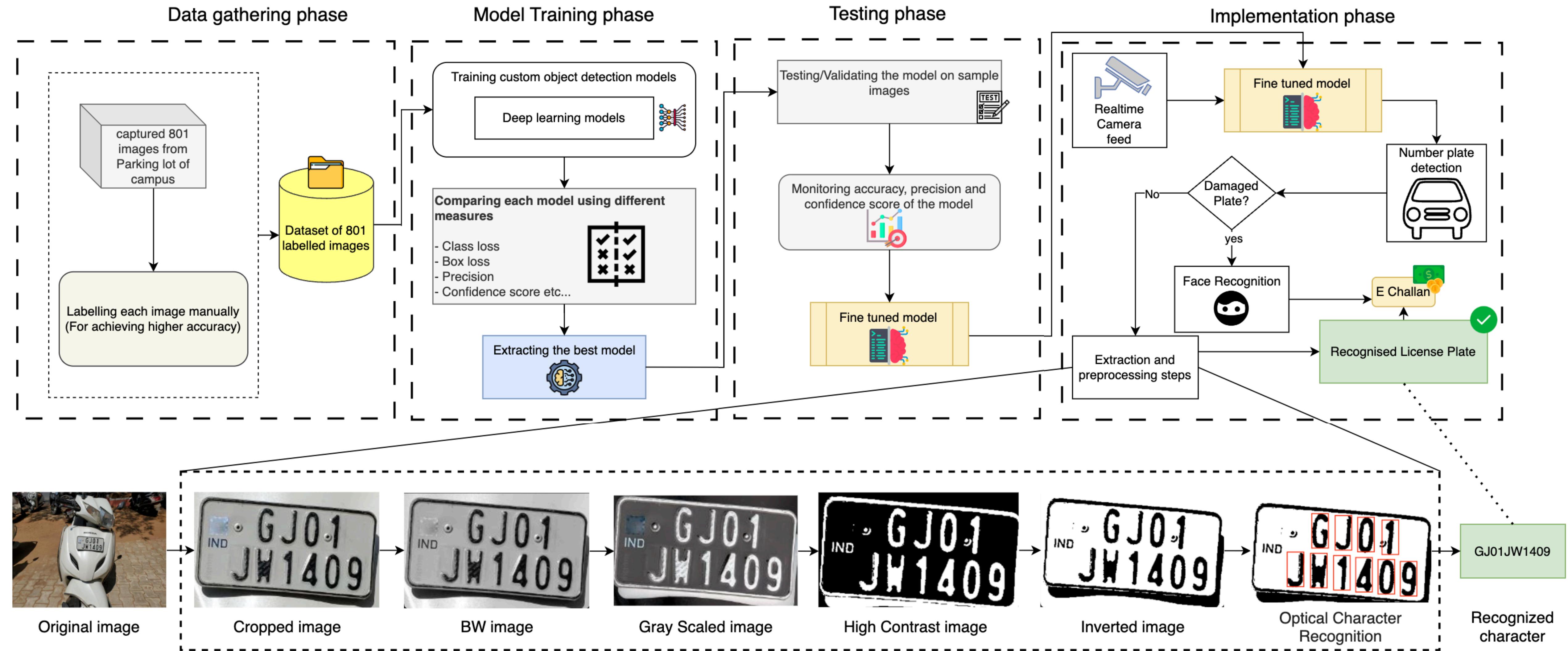
## Weaknesses

- **ANPR**
  - Low resolution
  - Availability of computational power
  - Obscured licensed plates
- **FR**
  - Full occlusion
  - Illumination
- **Privacy violations & Possible security breach**

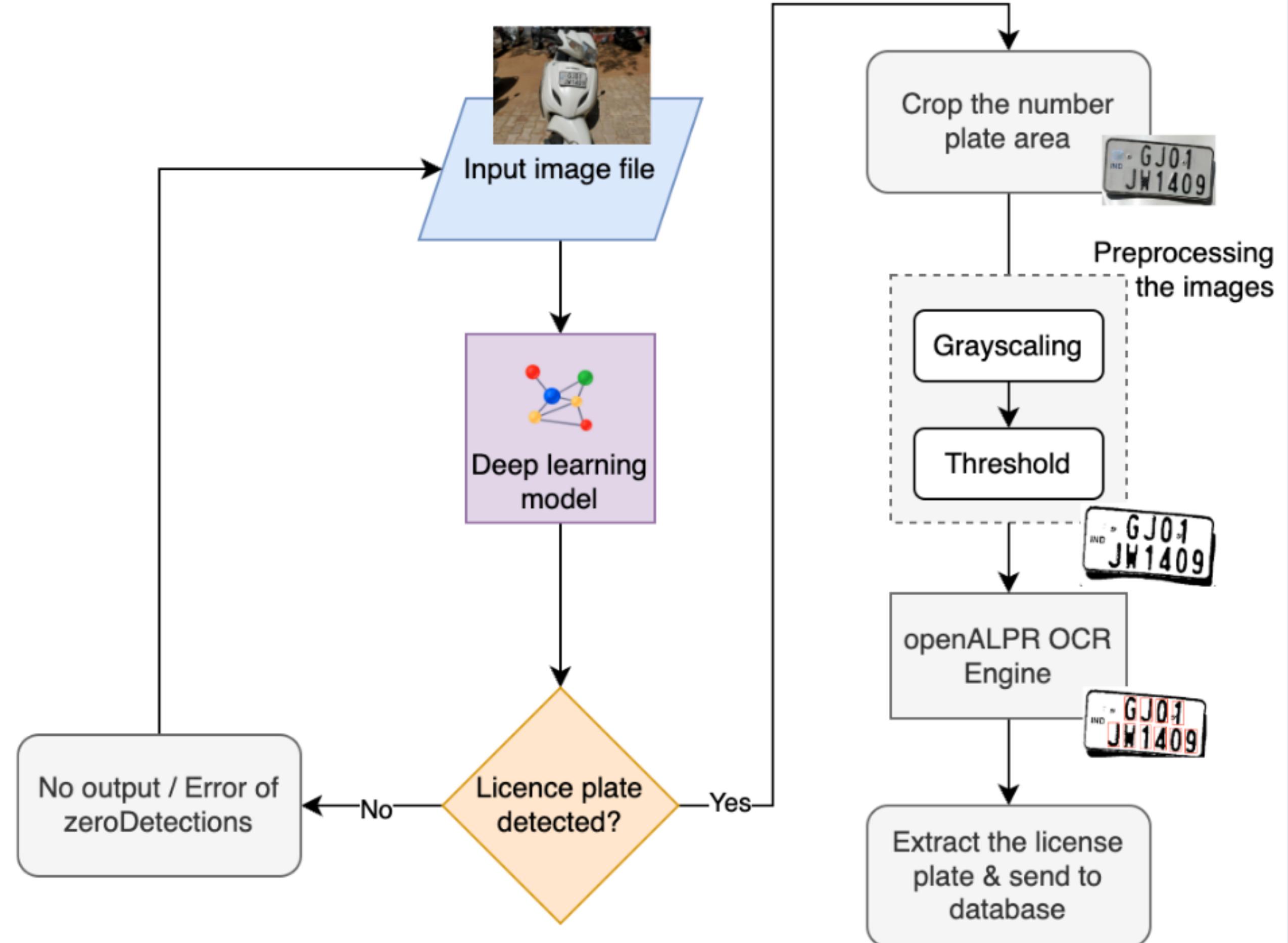
## Threats



# ARCHITECTURE



# SYSTEM FLOW DIAGRAM



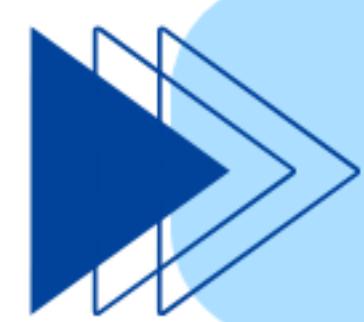
Model Name	No. Of Images	Class Loss	Box Loss	DFL Loss	Precision-Recall Value
YOLOv8s	483	0.7483	1.537	1.143	0.941
YOLOv8m	483	0.7736	1.566	1.217	0.942
YOLOv8s	563	0.4506	0.848	0.982	0.991
YOLOv8s	801	0.6137	1.099	1.202	0.991
YOLOv8n	801	0.8376	1.2712	1.123	0.898

## COMPARISON OF DIFFERENT TRAINED MODELS

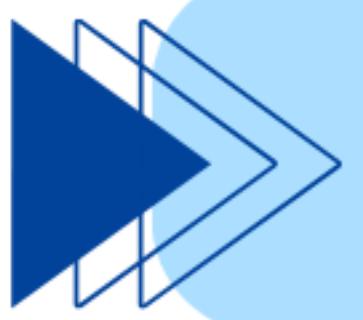
# BENEFITS

- **AUTOMATION:** Fully automated ANPR camera systems, which reduce cost, time, and manual intervention as fewer employees need to be hired.
- **REDUCED CORRUPTION:** As the manual intervention is less, there will be fewer chances of corruption.
- **DATA PRIVACY and SECURITY:** Strict security protocols ensure data privacy and security for ANPR models deployed on the cloud.
- **REAL-TIME TRACKING:** Real-time tracking using ANPR technology offers benefits such as quick identification, and detection of non-standardized license plates.
- **24 / 7 SYSTEM:** Because ANPR systems can operate 24/7, they reduce or eliminate the need for security patrols and manned guards.

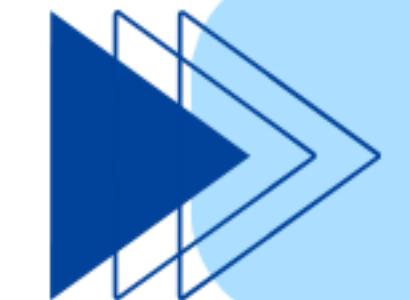
# APPLICATION DOMAINS



**OVER-SPEEDING**



**HARSH DRIVING**



**SNATCH and RUN**



**HIT and RUN**



**HIDING LP  
INTENTIONALLY**

# CONCLUSION

- In conclusion, our solution provides a highly accurate and reliable means of detecting license plates and faces from CCTV feeds.
- By using advanced algorithms and computer vision techniques, that makes it an more efficient for security and surveillance applications.
- Furthermore, ANPR systems with face recognition allows authorities to identify drivers and passengers and track their movements.
- We believe our solution will revolutionise the field of security and surveillance, by providing a more effective means of identifying and tracking people and vehicles.