

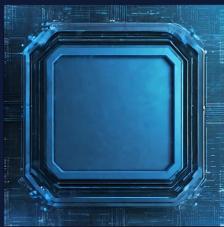
# Demystifying AI Empowering Tamil-speaking contributors in Smart Tech

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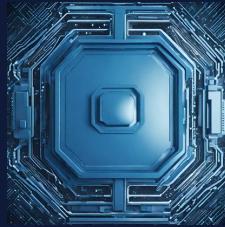
 Dr. U. Sabura Banu  
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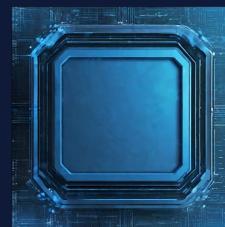
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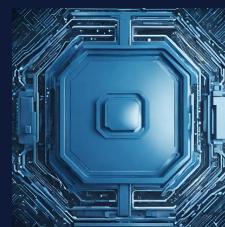
Introduction to  
Artificial Intelligence



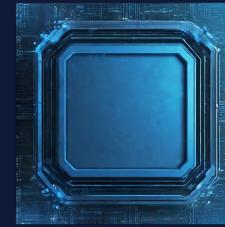
Exploring Smart  
Machines



Open Source  
Tools in AI



Community-Driven  
Innovation



Empowering  
Tamil-Speaking  
Contributions



Case Studies

# Key Technologies and Tools

## Natural Language Processing

NLP is a field of AI focused on the interaction between computers and human (natural) languages.

### What it does:

Helps machines **understand, interpret, generate, and respond** to human language (text or speech). It bridges the gap between machine language (code) and human language (e.g., Tamil, English).

### Examples

- ✓ Tamil chatbots and virtual assistants
- ✓ Speech-to-text (e.g., converting spoken Tamil into written form)
- ✓ Machine translation (English ↔ Tamil)
- ✓ Sentiment analysis of social media posts

# Key Technologies and Tools

## Computer Vision

Computer Vision enables machines to **see and interpret visual information** like humans do.

### What it does:

Processes images and videos to recognize patterns, objects, or text. Uses deep learning models to extract meaning from pixels.

### Examples:

Face detection in cameras

OCR (Optical Character Recognition) for Tamil printed or handwritten text

Object tracking in surveillance or smart farming

Gesture recognition in human-computer interaction

# Key Technologies and Tools

## Robotics

Robotics is the field that deals with **designing, building, and programming physical robots**, often powered by AI.

### What it does:

Combines sensors, actuators, and AI algorithms for **autonomous or semi-autonomous behavior**.

Robots can sense their environment, make decisions, and take action.

### Examples

Educational robots that teach Tamil alphabets

AI-powered delivery drones or cleaning robots

Industrial robots with visual inspection capabilities

Assistive robots for elderly or differently-abled individuals

# Importance of Language Inclusivity

## Bridging the Language Gap in Tech

Language inclusivity ensures that technological advancements reach diverse populations, enabling effective communication and participation across different languages and cultures.

## Enhancing Accessibility through AI

AI driven solutions can enhance accessibility by simplifying interactions for users with disabilities, offering text-to-speech, translation services and adaptive interfaces tailored to individual needs.

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# Exploring Smart machines



# Types of Smart Machines



## Robots

Robots are programmable machines capable of carrying out a variety of tasks autonomously or semi-autonomously, ranging from industrial applications to household chores.



## Autonomous vehicles

Autonomous vehicles are self-driving cars equipped with advanced sensors and AI technologies that allow them to navigate and operate without human intervention.



## Smart Home Devices

Smart home devices include appliances and systems that can be controlled remotely via smart phones or voice assistants, enhancing convenience, security and energy efficiency in households.



## Wearable Technology

Wearable technology consists of electronic devices worn on the body like fitness trackers and smart watches, which monitor health metrics and connect to other smart systems.

# Applications of Smart Machines

## Healthcare

In healthcare, smart machines facilitate remote monitoring, robotic surgeries and personalized medicine, significantly improving patient care and operational efficiency.

## Agriculture

In agriculture, smart machines such as drones and precision farming tools optimize planting, harvesting and resource management, improving yields and sustainability in farming practices

## Manufacturing

Smart machines in manufacturing including automated assembly lines and quality control robots, enhance productivity, precision and safety while reducing production costs.



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# Open source tools in AI



# Popular AI tools



## TensorFlow

TensorFlow is a comprehensive open-source platform for machine learning, widely used for its flexibility and robust ecosystem, allowing developers to build and deploy models across various environments.

## PyTorch

PyTorch is open-source deep learning framework known for its dynamic computation graph and ease of use, making it favorite for researchers and developers in AI applications.

## Keras

Keras is a user-friendly neural network API that runs on top of TensorFlow, designed to simplify the process of building and training deep learning models suitable for beginners and experts alike.

# Benefits of Open Source in AI

01

## Accessibility

Open source AI tools provide widespread access to advanced technology, allowing anyone with an internet connection to experiment, contribute and innovate, democratizing AI development.

02

## Community Support

The open source community fosters collaboration and knowledge sharing, learning to rapid advancements, a wealth of resources and collective troubleshooting, enhancing the overall development experience

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# Introduction

Artificial Intelligence



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# Community-D riven Innovation



# Historical context and current landscape

## Evolution of Tamil in Technology

The development of tamil in technology highlights its adaptability, from early software localization efforts to the rise of Tamil in AI and machine learning applications today

## Current contributions and Trends

Tamil-speaking contributors are actively shaping smart technology through software development, content creation and localization, influencing both local startups and global tech giants



# Importance of Community in AI Development

## Collaborative Contributions

Collaboration between individuals and organisations enhances problem solving abilities, allowing for diverse perspectives and ideas that drive more effective AI solutions

## Knowledge Sharing

Communities facilitate the exchange of insights, best practices and resources, promoting a culture of learning that accelerates AI research and application development across various sectors



# Inclusive AI Innovation

- Tamil speaking contributors enrich the AI landscape by bringing unique cultural perspectives and linguistic insights, fostering innovations that resonate with diverse user demographics

## Role of Tamil speaking Contributors



- Significant successes from inclusive AI initiatives highlight the importance of diverse contributions, showcasing how varied backgrounds lead to groundbreaking advancements in technology and applications

## Achievements and Examples



# OPEN SOURCE SOFTWARE FOR AI IN TAMIL



Kaniyam  
Voice  
Assistant

Uses RASA, DeepSpeech,  
and Tamil datasets



Open-Tamil  
(Python  
Library)

Tools for Tamil string  
manipulation and NLP



Ezhil  
Language  
Foundation

Tamil NLP, OCR, and  
education tools



TamilOCR

OCR engine using deep  
learning and Tesseract



Mozilla  
Common  
Voice -Tamil

Open dataset of Tamil  
speech recordings



AI4Bharat  
(Tamil NLP  
Tools)

Pretrained models for  
translation and TTS



IndicNLP  
Library

Supports multiple Indian  
languages



Thamizhi  
NLP Datasets

Datasets for POS tagging  
and translation



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# Empowering Tamil-speaking Contributors



# Resources for Learning AI

## Online courses

- A variety of online platforms offer AI courses specifically tailored for Tamil-speaking individuals, providing flexibility and diverse learning materials in native language

## Local Workshops

- Local workshops facilitate hands-on experience with AI technologies while encouraging community engagement, collaboration and direct interaction with industry experts

## Mentorship Programs

- Mentorship programs connect aspiring AI practitioners with experienced professionals, offering guidance, career advice and tailored learning paths to enhance skills in the field.

# Paths to Participation



## Joining Open Source Projects

- Participating in open source projects allows Tamil-speaking contributors to apply their skill, collaborate on real-world solutions and build a portfolio while contributing to the global community



## Attending AI conferences

- Attending AI conferences exposes Tamil-speaking individuals to the latest advancements in AI providing opportunities to learn, network and share knowledge with experts and peers



## Networking opportunities

- Engaging in networking opportunities helps Tamil-speaking contributors connect with industry professionals, discover collaboration possibilities and enhance their visibility in the AI landscape

# Opportunities and Challenges



## Opportunities for Tamil Speakers

- There is a growing demand for Tamil-speaking professionals in the tech sector, particularly in AI, data science and app development, providing numerous career paths and entrepreneurial opportunities



## Overcoming Challenges and Barriers

- Tamil speakers face hurdles related to resources, training and representation in tech. Addressing these challenges involves advocacy, education and community support initiative to foster participation.



## Case studies of success

- Highlighting successful Tamil Tech entrepreneurs and startups, this section showcases real-life examples demonstrating the impact of tamil-speaking professionals in the smart technology landscape

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# AI for Non-coders



# Definition and History

## What is AI?

- Artificial Intelligence (AI) refers to the simulation of human intelligence in machines programmed to think and learn like humans, capable of problem-solving and decision-making tasks

## Key milestones in AI development

- Key milestones include the development of the first neural networks in the 1980s, IBM's Deep Blue defeating chess champion Garry Kasparov in 1997 and the rise of powerful deep learning frameworks in the 2010s

## Evolution of AI

- The evolution of AI spans from early algorithms and theoretical concepts in the 1950s to the current advancements in deep learning and natural language processing, showcasing a rapid technological progression.

# Try AI without coding

Google

Teachable Machine – Train with  
webcam/sounds

[https://teachablemachine.withgoogle.com/trai  
n](https://teachablemachine.withgoogle.com/training)

ChatGPT – Ask AI with  
anything

RunwayML – Create AI video  
and images

Canva Magic Write – AI writing  
assistant

Pictory – AI to make videos  
from text

[https://www.imagine.art/dashboard/video?utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=G\\_I\\_Web\\_WW\\_Vid\\_New\\_C&utm\\_term=runwayml&utm\\_campaign=&utm\\_source=adwords&utm\\_medium=ppc&hsa\\_acc=3029240990&hsa\\_cam=21946056225&hsa\\_grp=170862697363&hsa\\_ad=723071517735&hsa\\_src=g&hsa\\_tgt=kwd-1217688766738&hsa\\_kw=runwayml&hsa\\_mt=b&hsa\\_net=adwords&hsa\\_ver=3&gad\\_source=1&gad\\_campaignid=21946056225&gbraid=0AAAAACs5ry-BYYP9smoyLMULVut8yQs0e&gclid=Cj0KCQjw-NfDBhDyARIsAD-ILeBxh09crRPQ2E\\_oGVY7gsY7SDYyTC7cjfSQHVbxWqV9AR9\\_lqscMhoaAu1EEALw\\_wcB](https://www.imagine.art/dashboard/video?utm_source=google&utm_medium=cpc&utm_campaign=G_I_Web_WW_Vid_New_C&utm_term=runwayml&utm_campaign=&utm_source=adwords&utm_medium=ppc&hsa_acc=3029240990&hsa_cam=21946056225&hsa_grp=170862697363&hsa_ad=723071517735&hsa_src=g&hsa_tgt=kwd-1217688766738&hsa_kw=runwayml&hsa_mt=b&hsa_net=adwords&hsa_ver=3&gad_source=1&gad_campaignid=21946056225&gbraid=0AAAAACs5ry-BYYP9smoyLMULVut8yQs0e&gclid=Cj0KCQjw-NfDBhDyARIsAD-ILeBxh09crRPQ2E_oGVY7gsY7SDYyTC7cjfSQHVbxWqV9AR9_lqscMhoaAu1EEALw_wcB)

# 6

# Case studies : Tamilnadu



# E-Velanmai Project

Domain: Agriculture + AI

Summary: Used ICT tools (and later ML) to connect farmers with agricultural experts for real-time solutions.

Impact: Increased productivity, reduced crop damage, enhanced advisory services in Tamil.

<https://techtamilnadu.in/2025/03/21/ai-in-tamil-nadu-agriculture/>

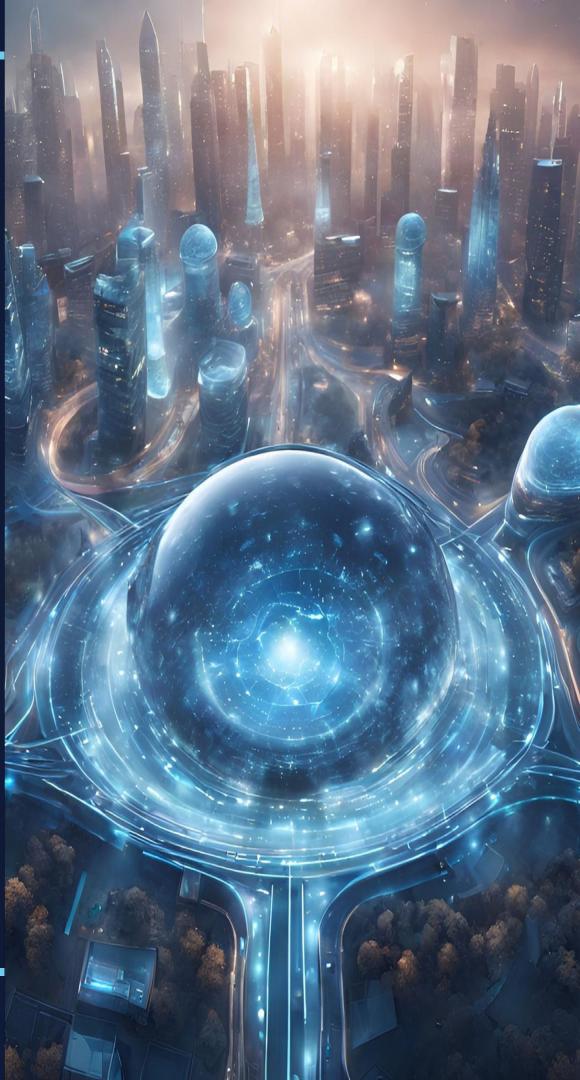


# AI-Powered Crop Advisory App for Tamil Farmers

Domain: Agriculture & AgriTech

Summary: Developed by Tamil Nadu Agricultural University and agri-startups, this app leverages AI to provide personalized recommendations on crop rotation, pest control, and irrigation. It integrates satellite, soil, and climate data.

Impact: Over 20,000 farmers benefited through improved crop yield and reduced losses. A Tamil-language chatbot makes it accessible to low-literacy users.



# AI-based Tamil Handwriting Recognition (Anna University)

Domain: Education + AI

Summary: Developed models for Tamil character recognition using CNNs.

Impact: Enabled digitization of old Tamil manuscripts and educational material.

என்பது கீலம். மாநிலை எண். மாநிலை கீலம். என்பது எண்.  
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எழுதி அழகி சிழுஞ் வழக் கூகி அழகி ...

# AI Teachers in Tamil for Rural Schools

Domain: EdTech & AI in Education

Summary: CSR-funded EdTech firms deployed AI-driven tutors that teach STEM subjects in Tamil using gamified content and speech interfaces.

Impact: Improved learning outcomes for students in tribal and remote villages lacking qualified teachers.

<https://www.youtube.com/watch?v=AXur63qzS00>



# AI Traffic Management – Chennai Smart City

Domain: Urban Mobility

Summary: Pilot projects using AI-based surveillance and traffic signal control.

Impact: Reduced congestion and improved emergency vehicle response times.



# **Localized Voice Assistants in Tamil (Open-Source Projects)**

Domain: AI/NLP

Summary: Tamil voice assistant prototypes like “Kani” built with open-source NLP stacks (RASA, Mozilla DeepSpeech).

Impact: Enabled non-English speaking users to interact with smart tech in native language.



# AI for Dengue Forecasting in Madurai

Domain: Healthcare

Summary: Predictive models developed using environmental and population data to forecast dengue outbreaks.

Impact: Helped early intervention and public health planning.



# AI-based Tuberculosis Detection in Government Hospitals

Domain: Healthcare & Diagnostics

Summary: Piloted by the Tamil Nadu Health Department in collaboration with AI health startups, this system uses CNNs to analyze chest X-rays and detect TB at early stages.

Impact: Enhanced TB screening accuracy in rural Primary Health Centres (PHCs), reducing misdiagnosis and speeding up treatment initiation.



# Demystifying AI

- Artificial Intelligence (AI) often feels abstract or out of reach—especially for communities where access to technology and English-language resources is limited.
- **Demystifying AI** means breaking down complex AI concepts into simple, accessible ideas and tools that everyone, including Tamil-speaking individuals, can understand and use.

# Voice AI for Speech Disorders in Tamil

Domain: Speech Therapy & Assistive Health

Summary: Developed by IIT Madras and regional audiology clinics, this AI tool analyzes Tamil speech patterns to detect disorders like aphasia and dysarthria.

Impact: Facilitated early detection and personalized therapy for Tamil-speaking patients, bridging gaps in rural and urban healthcare access.



# **Sentiment Analysis for Tamil Political Texts (University of Madras)**

Domain: Social Media Monitoring

Summary: AI models trained to analyze public opinion from Tamil tweets during elections.

Impact: Provided insights for media and policy analysts.



# **OCR for Tamil Palm Leaf Manuscripts – Raja Muthiah Research Library + TNC**

Domain: Cultural Heritage + AI

Summary: Deep learning-based OCR tools used to digitize and transcribe ancient Tamil manuscripts.

Impact: Preserved cultural knowledge and enabled global access.



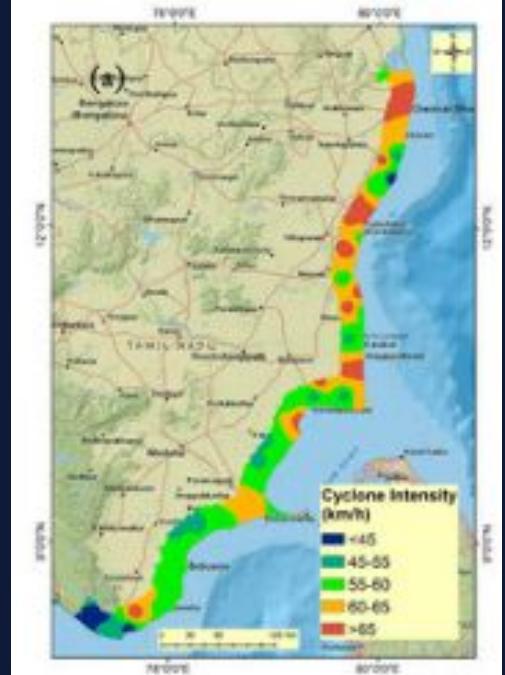
# AI in Disaster Management

## – Coastal Tamil Nadu

Domain: AI + Sustainability

Summary: AI-powered flood warning systems using weather and ocean data.

Impact: Improved evacuation planning and coastal safety during cyclones.

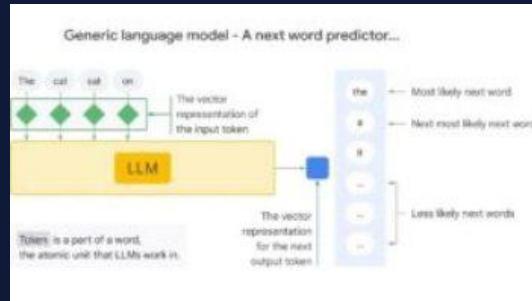


# Tamil Dataset Curation for LLMs – Kaniyam Foundation

# Domain: Open Data/Language Models

Summary: Community effort to curate Tamil text datasets (news, literature, wiki) for training open-source Tamil LLMs.

**Impact:** Democratized AI development in Tamil and enabled Tamil-native AI tools.



# Tamil Text-to-Speech (TTS) and OCR Tools

Domain: Language Technology & Accessibility

Summary: Initiated by Anna University, Tamil Nadu Archives, and open-source communities, these tools convert scanned Tamil text into machine-readable and audio formats using deep learning.

Impact: Supported visually impaired learners, enabled digitization of Tamil literature, and aided e-governance applications.

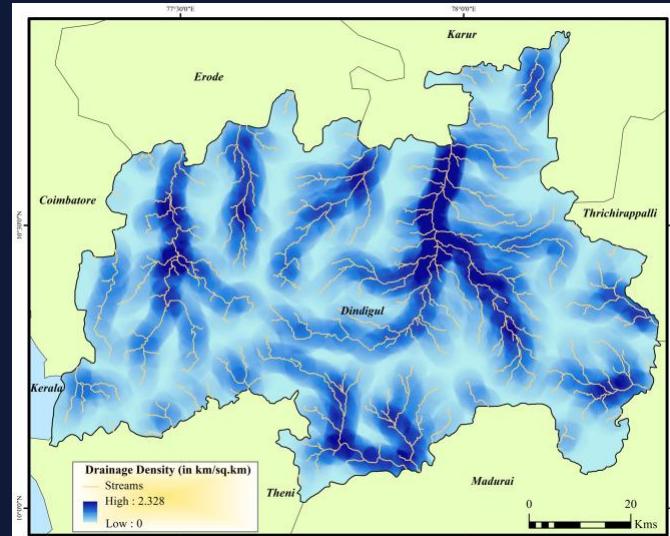


# AI for Groundwater Prediction in Dindigul and Erode

Domain: Sustainability & Environmental AI

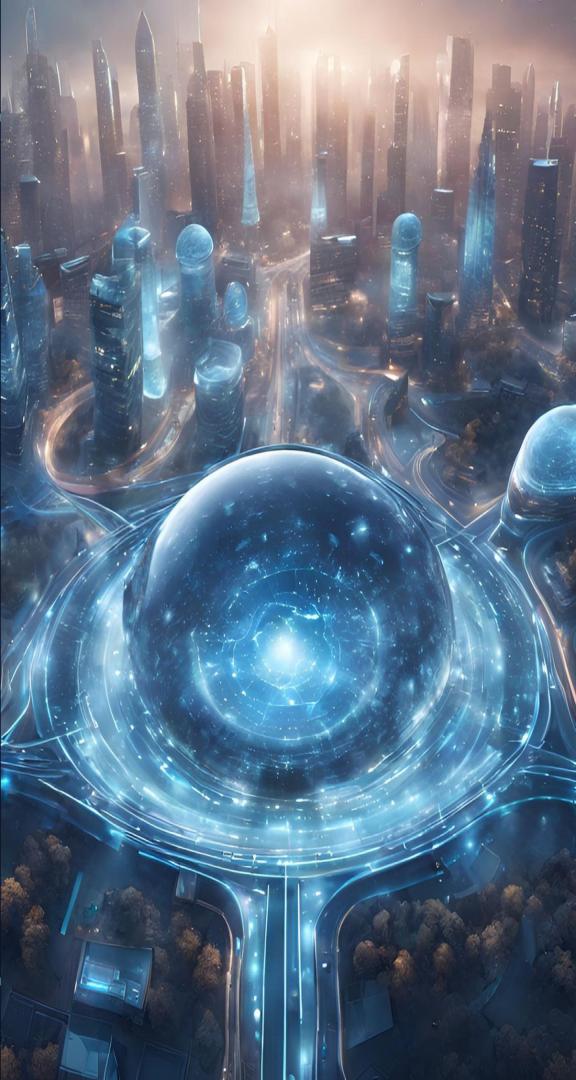
Summary: Local NGOs and IITM researchers used machine learning on rainfall and borewell data to model groundwater availability.

Impact: Promoted sustainable water management practices, helping farmers optimize irrigation in drought-prone districts.



# Our contributions

- **Patient Assistance Device**
- **Fall Detector**
- **Somnambulism Detector and Alerter**



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# Future Prospects and Recommendations



# Emerging Trends in AI



## Innovations in Natural Language Processing

Recent breakthroughs in NLP, including transformer models and unsupervised learning techniques, are enhancing AI's ability to understand and generate human language thus transforming communication and interaction



## AI Advancements in Tamil Language Tech

There is a growing focus on developing AI technologies specific to the Tamil Language, including speech recognition and text-to-speech capabilities, which are essential for broader accessibility and localization



# Importance of Language in Technology



## Communication Barriers

Language plays a critical role in technology, as it can create barriers that limit user interaction and accessibility, affecting overall user satisfaction and engagement with technological tools



## Cultural Perspectives

Understanding language nuances is essential for technology to be effective globally as varying cultural contexts can influence communication styles and expectations in technology users





# Thank you!



# **Why Tamil-speaking inclusion matters?**

- . Tamil is one of the world's oldest and most spoken classical languages.
- . Millions of Tamil speakers lack AI-accessible content or tools in their native language.
- . Bridging the language-tech gap is critical for inclusive innovation and digital equity.

# **How Can Tamil Contributors Participate in Smart Tech?**

- Learn in Tamil: Use localized resources, videos, and tools in Tamil to understand AI basics.
- Create Tamil Datasets: Contribute to or build language datasets that power Tamil voice assistants, chatbots, and NLP models.
- Build Open Tools: Develop or localize open-source AI tools for agriculture, education, and governance.
- Collaborate in Communities: Join AI forums, hackathons, and open-source projects focused on Tamil.

# Key Technologies and Tools

## Machine Learning

Machine Learning is a subset of AI that allows computers to **learn from data** and improve over time **without being explicitly programmed**.

### Key Idea:

Instead of giving the computer step-by-step instructions, we feed it data and let it learn patterns or rules from that data.

### Types of ML:

**Supervised Learning** – Learn from labeled data (e.g., Tamil letter → label “ஏ”)

**Unsupervised Learning** – Find hidden patterns (e.g., grouping similar Tamil words)

**Reinforcement Learning** – Learn by trial and error (e.g., training a robot to walk)

### Examples:

Predicting crop yield based on weather data

Recommending Tamil movies based on viewing history

Email spam detection

# Key Technologies and Tools

## Neural Network

Neural Networks are **mathematical models inspired by the human brain**, made up of layers of interconnected nodes (called “neurons”).

### Key Idea:

They take inputs (like images or sounds), process them through hidden layers, and produce outputs (like classifying a Tamil character).

### Structure:

**Input Layer** – Receives the data (e.g., pixels from an image)

**Hidden Layers** – Process data with weights and activations

**Output Layer** – Gives final prediction (e.g., “This is the letter கு”)

### Advanced Forms:

**Convolutional Neural Networks (CNNs)** – great for images

**Recurrent Neural Networks (RNNs)** – great for sequences (e.g., Tamil sentences)

**Transformers** – power modern language models like ChatGPT and BERT

### Examples:

Handwriting recognition of Tamil script

Translating English to Tamil using neural language models

Identifying diseases from medical images