

Forgery Detection in Handwritten Signatures Using Spiking Neural Networks

Motivation

- Handwritten signatures are widely used for **identity verification**
- Traditional systems rely on **manual inspection or classical ML methods**
- These systems can struggle with:
 - skilled forgeries
 - high computational cost
 - lack of temporal processing
- **Spiking Neural Networks (SNNs)** mimic biological neurons and process **temporal information efficiently**
- **Goal:**
Investigate whether **SNNs can improve signature verification accuracy and efficiency.**

Why SNN for Signature Verification?

Title: Why Spiking Neural Networks?

Content:

- Advantages of SNN:
- **Biologically inspired learning**
- **Event-based processing**
- **Low energy consumption**
- **Naturally handles temporal patterns**
- Signatures contain:
 - stroke order
 - timing
 - pressure changes
- These characteristics make **SNN a promising approach for signature verification.**

Building a Tool-Using LLM Agent for Automated Problem Solving

Motivation

- Large Language Models can generate human-like responses and explain complex topics
- However, LLMs alone have important limitations:
- They may produce incorrect answers
- They cannot reliably perform precise calculations
- They do not directly interact with external tools or live data
- Many real-world problems require more than text generation:
- searching for information
- using calculators
- querying databases
- calling APIs

Why Tool-Using Agents?

- A tool-using LLM agent can:
 - understand the user's problem
 - choose the right tool for the task
 - execute actions step by step
 - combine tool outputs into a final answer
- **Benefits:**
 - higher accuracy
 - better reliability
 - ability to solve multi-step tasks
 - more practical real-world applications

Autonomous Web Navigation Agents Using Large Language Models

Motivation

- Many everyday tasks require **manual navigation through websites**
 - searching for information
 - filling forms
 - booking services
 - comparing products
- These tasks are often:
 - **time-consuming**
 - **repetitive**
 - **require multiple steps across pages**
- Current chatbots can **answer questions**, but they **cannot autonomously interact with websites**.
- **Goal:** Develop AI agents that can **understand web pages and perform tasks automatically**.

LLM + Web Agents

- **Why Large Language Models for Web Agents?** 🤖
- **Title:** Why LLM-Based Agents?
- **Content:**
- Large Language Models provide new capabilities for intelligent agents:
- **Natural language understanding** of user instructions
- **Interpretation of web page content** (HTML, buttons, forms)
- **Reasoning and planning** multi-step actions
- **Tool usage** (browser APIs, search engines)