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**SCHOOL OF
ENGINEERING**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Artificial Intelligence and Machine Learning)



PRODUCT - DOCUMENT

PROJECT - TITLE

““AI – MEME GENERATOR””

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1. Product Overview

The AI Meme Generator is a lightweight software product designed to automatically create memes by combining artificial intelligence captioning with real-time image rendering. The product accepts a user-uploaded image, generates a caption using a trained LSTM model, and produces a final meme that can be downloaded.

Its purpose is to simplify meme creation by automating text generation and formatting tasks.

2. Purpose

The primary purpose of this product is to:

- Reduce manual effort in writing meme captions
- Provide a fast, AI-powered alternative to traditional editors
- Help users generate memes with minimal skills
- Offer a clean and interactive interface
- Improve content creation efficiency

This product serves both casual users and content creators.

3. Product Modules

The product consists of the following modules:

3.1 Caption Generation Module

- Uses a pre-trained LSTM model
- Predicts humorous and readable captions
- Generates text word-by-word
- Uses tokenizer for converting words to/from tokens

3.2 Caption Enhancement Module

- Polishes the generated caption
- Fixes grammar and sentence flow
- Improves clarity and humor tone

3.3 Image Upload Module

- Accepts JPG, PNG, JPEG
- Displays preview of uploaded image

3.4 Meme Rendering Module

- Uses Pillow (PIL) for image editing
- Applies caption on the image
- Adds outline and alignment for readability
- Produces final meme output

3.5 User Interface Module

- Built using Streamlit
- Provides buttons for generating, enhancing, and downloading
- Displays meme preview in real time

4. Product Workflow

The product follows a simple, sequential workflow:

1. User uploads an image
2. The system loads the caption model
3. A caption is generated
4. Caption enhancement improves the output
5. The caption is rendered on the image
6. Final meme is displayed and downloaded

This workflow ensures quick and automated creation of memes with minimal interaction.

5. Feature List

The product offers the following features:

- AI-generated meme captions
 - Real-time preview
 - One-click meme generation
 - Caption enhancement for improved quality
 - Support for multiple image formats
 - High-resolution meme output
 - Simple and interactive UI
 - Fast processing even on low-end systems
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6. Requirements

6.1 Hardware Requirements

- Minimum 4 GB RAM
- Dual-core processor
- At least 500 MB disk space

6.2 Software Requirements

- Windows 10/11 or Linux OS
 - Python 3.9 or above
 - Required packages listed in requirements.txt
 - Streamlit framework
 - TensorFlow/Keras
 - Pillow (PIL)
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7. Installation Summary

1. Extract the project folder
 2. Open terminal in project directory
 3. Create a virtual environment
 4. Install dependencies using:
 5. `pip install -r requirements.txt`
 6. Run the product with:
 7. `streamlit run app/app.py`
 8. Browser opens the application automatically
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8. Product Limitations

- Caption quality depends on training dataset
 - The AI model cannot understand image content
 - Works only with supported image formats
 - Requires model file (meme_lstm.h5) to be present
 - Caption humor may vary depending on context
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9. Future Upgrades

- Transformer-based caption generation
 - Multi-language meme support
 - Category-specific humor generation
 - Cloud deployment
 - Mobile version of the product
 - More meme templates and layouts
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10. Conclusion

The AI Meme Generator product provides a modern and efficient solution for meme creation by combining AI text generation with intuitive user interaction. It reduces manual effort, increases productivity, and delivers high-quality meme outputs suitable for social media, entertainment, and creative content needs.

With future upgrades, the product can evolve into an even more powerful AI-based content creation tool.
