# PROJECT PROPOSAL

# ALERGLOW


**Proposed By :**

**Team 7 - Machine Learning D**

- Aditya Muhamad Maulana
- Arham Syuhada
- Rifky Zaini Faroj
- Rifqi Syekhi Marsaputra

# TABLE OF CONTENT

# OUR TEAM

## Aditya Muhamad Maulana

I'm currently busy with classes and internships, and I'm interested in AI because of its growing role in the tech world. I want to explore AI because I see its great potential in various industries.

Machine Learning Developer

"Aegroto dum anima est, spes est."

- https://www.linkedin.com/in/adtyamm/ https://github.com/Adtyammm

## Arham Syuhada

Passionate about technology, I keep up with the latest trends and innovations. Blending my academic studies with practical experience in advertising, I aim to merge creativity with cutting-edge technology for impactful solutions.

Engineer

"Bridging Creativity and Technology"

- https://id.linkedin.com/in/arham-syuhada-932754199 https://github.com/arhamsyuhada

# OUR TEAM

## Rifky Zaini Faroj

Currently a student at UIN Bandung, I am interested in artificial intelligence and technological innovation in various fields, and continue to update my knowledge through literature, online courses, and AI communities.

Researcher

"I'm tired but I won't give up."

- https://www.linkedin.com/in/rifkyzainifaroj/ https://github.com/rifkyzainix

## Rifqi Syekhi Marsaputra

I love learning new things related to programming and graphic design. In this project, I will work on and learn about frontend and backend, this can encourage my learning spirit.

Front-end Developer

"The best people in life are free"

- https://www.linkedin.com/in/rifqisyekhi/ https://github.com/rifqisyekhi

# TOPIC AND MOTIVATION

**Hadist**: **"***The Prophet Muhammad (peace be upon him) said: "No Muslim is afflicted with hardship, pain, anxiety, grief or harm, even if it be the prick of a thorn, except that Allah will expiate his sins because of it.*"
(Narrated by al-Bukhari and Muslim)

**Quran** : "*Allah does not burden a soul beyond that it can bear. It will have [the consequence of] what [good] it has gained, and it will bear [the consequence of] what [evil] it has earned. 'Our Lord, do not impose blame upon us if we forget or make a mistake. Our Lord, and lay not upon us a burden like that which You laid upon those before us. Our Lord, and burden us not with that which we have no ability to bear. And pardon us; and forgive us; and have mercy upon us. You are our protector, so give us victory over the disbelieving people.*"' (Quran, 2:286)

**Many** people suffer from skin allergies that can cause discomfort and concern. However, it is often difficult for them to identify the symptoms of such allergies appropriately and obtain accurate information on how to properly care for their skin.

**Therefore**, there is a need for a solution that can help users quickly identify skin allergy symptoms and provide appropriate information and treatment advice.

# TARGET USER GROUP

Target user groups for the *AlerGlow* application may include:

- **Individuals** who have busy schedules and do not have time to consult a dermatologist in person can also be targeted. They can use this app as a quick and practical way to get information on skin allergy symptoms and necessary treatments.
- **Individuals** seeking online medical solutions for their skin problems will be a relevant target. They may be looking for alternatives to visiting a doctor in person and seek information and treatment advice through online platforms.

# PROPOSED SOLUTION

## A. Product Branding

- **Double love**: symbolizes affection, care, and concern for health and well-being
- **Four thin crescent lines**: symbolizes protection against "Double love"
- **Two hands**: symbolizes cooperation, unity, or oneness in achieving a common goal.
- **Blue Colors**: symbolizes the element of tranquility, and kindness

## B. Description

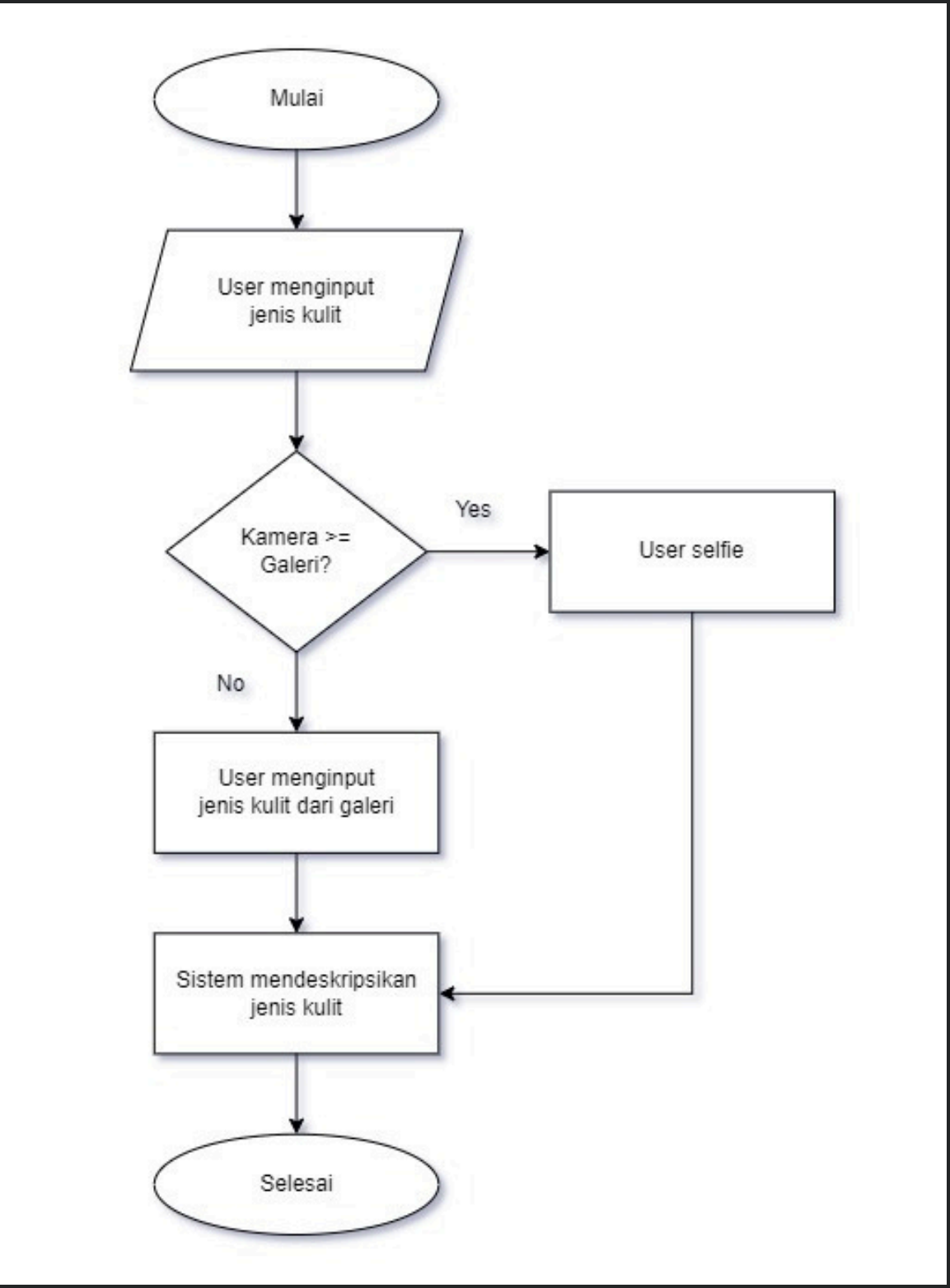
**Alerglow** is an innovative app that uses Convolutional Neural Network (CNN) algorithm to accurately detect skin allergies. With Alerglow, users can easily overcome the difficulty in identifying skin allergy symptoms that are often confusing. The app provides an effective and quick solution to know the type of skin allergy experienced, helping users in taking better care of their skin.

## C. Related to SDGs

### SDG 3: Good Health and Well-Being

**Alerglow** helps in preventing and reducing the negative impact of skin allergies on users' health and well-being. By helping users identify skin allergy symptoms and providing appropriate treatment information, Alerglow contributes to efforts to improve people's health and well-being.

# D. Application Flowchart



# RESEARCH QUESTION

- **How** well does this application recognize allergic skin problems?
- **What** types of allergic skin problems can be identified by this application?
- **How** accurate is this application compared to a doctor's diagnosis?
- **Are** users satisfied with the way they use this application and the information provided?

# OBJECTIVE

- **Developing** and testing a program capable of identifying allergic skin conditions using the latest technology.
- **Gathering** and examining numerous images of allergic skin issues to train the program.
- **Investigating** the effectiveness of the program in identifying allergic skin problems through trials.
- **Enhancing** the application's functionality based on user feedback to make it easier to use and more helpful.

# RESEARCH METHODOLOGY

## A. Data Collection

**The** data was obtained from the Kaggle platform, a data source that provides access to various datasets. The data was then divided into two main classes: allergic and non-allergic symptoms. A data augmentation process was also performed to increase variation and reduce the possibility of overfitting.

## B. Data Preprocessing

**The** images in the dataset were checked to ensure validity and eliminate duplicates. Data augmentation was also performed to add variety to the dataset.

## C. Model Architecture Design

**The** model architecture uses a Convolutional Neural Network (CNN) which consists of a convolution layer, a pooling layer, and a fully connected layer. The convolution layer is responsible for extracting important features from the image, the pooling layer is used to reduce the dimensionality of the data, while the fully connected layer is responsible for the classification process.

## D. Model Training

**The** model was trained using 15 epochs with a batch size of 64, using input data of 56x56 pixels.

## E. Model Testing Design

**The** model is tested using test image data, where each class is tested using the pre-trained model.

# LIST OF METHODS AND TECHNOLOGIES USED IN THIS PROJECT

| | | |
|---|---|---|
| 1. | **Convolutional Neural Network (CNN)** | CNN is used to analyze skin images uploaded by users and identify allergy symptoms on the skin, such as rash, swelling, or itching. CNNs are very effective in retrieving important features from complex images. |
| 2. | **ReactJS** | ReactJS is used as a frontend framework for building the user interface (UI) of web applications. ReactJS allows developers to create dynamic and responsive UI components. |
| 3. | **Flask** | Flask is used as a backend framework to organize business logic and provide RESTful API services. Flask is a good choice for building web applications with a lightweight and easy-to-use backend. |
| 4. | **VS Code** | Visual Studio Code is used as an Integrated Development Environment (IDE) for code development. VS Code has various features that support web application development, including debugging and integration with various extensions. |
| 5. | **Google Colab** | Google Colab, which stands for Google Collaboratory, is used as a platform for training CNN models. Colab provides free access to GPUs and TPUs which speeds up the training process of neural network models. |
| 6. | **MobileNetv2** | MobileNetv2 is a convolutional neural network architecture optimized for mobile devices. This architecture is used as the basis for the CNN model in this project to recognize skin allergy symptoms. |
| 7. | **Python** | Python is a programming language used widely in web application development and artificial intelligence. Python is used in this project to implement backend logic, CNN model training, and general development. |
| 8. | **Django (Optional)** | Django is an alternative backend framework that can be used to develop web applications. Although optional, Django can be used instead of Flask to provide more complete and structured backend services. |

# TIMELINE

| Time | System Specification (UML) |
|---|---|
| 18 May | Use Case Diagram |
| 18 May | Sequence Diagram |
| 19 May | Class Diagram |
| 19 May | Entity Relational Diagram |
| 20 May | Physical Data Model |

| Time | Design |
|---|---|
| 23 - 30 May | Design Wirframe in Figma |
| 30 May - 10 June | Implement UI in Frontend |

| Time | Deployment |
|---|---|
| 10 - 18 June | Deploy Frontend |
| 18 - 24 June | Deploy Backend |
| 24 June | End to end Testing |

*Task and Processing times can change at any time*

# 10 REFERENCES JOURNALS OR CONFERENCE PAPERS

| 1. | Title | Practical guide to skin prick tests in allergy to aeroallergens |
|---|---|---|
| | Problem | The paper highlights the critical issues surrounding the clinical relevance of novel allergenic molecule techniques and the potential unnecessary increase in complexity and costs of diagnosis procedures. |
| | Proposed Solution | The authors suggest active surveillance to monitor changing sensitization rates, the development of certified reference materials for allergenic products, and the validation of methods for quantification |
| | Method | The study discusses the practical use of skin tests, skin prick testing, and sublingual immunotherapy to diagnose allergic diseases |
| | Result | The research emphasizes the need for more basic knowledge about relevant allergens, the variability in allergen content in diagnostic extracts, and the importance of assessing the reliability of skin prick tests |
| | End-Product | The end-product of this research is the dissemination of knowledge that can guide healthcare professionals in improving the diagnosis and management of allergic diseases based on the latest advancements and challenges in the field |
| | Conclusion | The paper provides valuable insights into the challenges and advancements in diagnosing allergic diseases. However, it underscores the necessity for establishing the clinical relevance of new techniques and the importance of active surveillance to adapt to changing sensitization rates |

| 2. | Title | Human Skin Diseases Detection and Classification using CNN |
|---|---|---|
| | Problem | Skin diseases, especially Melanoma skin cancer, pose a significant threat to human life due to high mortality rates. Traditional detection methods are time-consuming and require expert intervention, leading to delays in diagnosis and treatment. |
| | Proposed Solution | The paper proposes a deep learning-based Convolutional Neural Network (CNN) method for classifying skin diseases, utilizing approximately 2102 dermatoscopic image datasets. Pre-processing steps like Morphological Transformations, Normalization, and Augmentation are performed to enhance model efficiency. |
| | Method | The proposed model consists of Convolutional Layers, Max-Pooling Layers, and Large training images for Human vs. Machine dataset containing 2102 image data with metadata. The model undergoes pre-processing steps and utilizes CNN architecture for skin disease classification. |
| | Result | The experiment results demonstrate an accuracy of 89.45% in detecting skin cancer disease using the proposed CNN model. |
| | End-Product | The end-product of this research is an efficient deep learning-based CNN model for the detection and classification of various skin diseases, particularly Melanoma skin cancer. |
| | Conclusion | The paper highlights the importance of early diagnosis in skin diseases, especially Melanoma skin cancer, and introduces a promising CNN-based approach with high accuracy. However, challenges such as data scarcity, sample imbalance, and noisy data in skin disease datasets need to be addressed for real-world clinical applications. |

| 3. | Title | Skin Diseases Classification Using Local Binary Pattern and Convolutional Neural Network |
|---|---|---|
| | Problem | Skin diseases are often underestimated due to lack of knowledge, leading to incorrect diagnosis and treatment, potentially worsening the condition. |
| | Proposed Solution | Introducing a method using Local Binary Pattern (LBP) and Convolutional Neural Network (CNN) for early detection and classification of skin diseases based on shape, color, and texture in digital images. |
| | Method | LBP is utilized for feature extraction by comparing pixel values with neighboring pixels, generating histograms for skin disease characterization. CNN is employed for classification based on extracted features. |
| | Result | The combination of LBP and CNN achieved a high accuracy level of around 92% in classifying skin diseases based on image analysis. |
| | End-Product | The research provides a method for automated skin disease detection and classification, aiding in early identification and treatment. |
| | Conclusion | The research showcases the effectiveness of combining LBP and CNN for skin disease classification, offering a promising approach for automated disease detection and classification in the field of dermatology. |

| 4. | Title | EczemaNet: A Deep CNN-based Eczema Diseases Classification. |
|---|---|---|
| | Problem | Eczema is challenging to distinguish due to symptom similarities, and there is a lack of automated detection systems for eczema diseases |
| | Proposed Solution | The paper proposes a novel deep CNN-based approach for classifying five different classes of Eczema using a collected dataset. Data augmentation and regularization techniques like batch normalization and dropout were employed to enhance performance. |
| | Method | The model was trained using a batch size of 32 and Adam optimizer with a learning rate of 0.0001. Regularization methods like dropout and batch normalization were utilized to reduce overfitting. The model architecture included fully connected layers, max pooling layers, and dropout layers. |
| | Result | The proposed model achieved an accuracy of 96.2%, surpassing state-of-the-art performance. The confusion matrix illustrated the model's classification performance. |
| | End-Product | The end-product of this research is a deep CNN-based model capable of accurately classifying different types of Eczema with a high level of accuracy. |
| | Conclusion | The proposed EczemaNet model showcases impressive accuracy, outperforming existing methods. The utilization of deep CNNs, data augmentation, and regularization techniques highlights the effectiveness of the approach in automating eczema disease classification. However, further validation on larger and diverse datasets could enhance the generalizability of the model. |

| 5. | Title | An automated detection of Scabies skin disease Using Image Processing and CNN |
|---|---|---|
| | Problem | Skin diseases are common, but diagnosis can be expensive and time-consuming, leading to a lack of interest in seeking treatment. |
| | Proposed Solution | The paper proposes a methodology that combines image processing and Convolutional Neural Networks (CNN) to detect scabies. |
| | Method | Image processing techniques are used for feature extraction and classification. |
| | Result | The proposed methodology achieves a high accuracy of 97.25% in detecting scabies. |
| | End-Product | The end-product of this research is an automated system capable of accurately detecting scabies using image processing and CNN. |
| | Conclusion | The paper outperforms existing methods in the literature, showcasing its effectiveness in automating disease detection, which aligns with the principles of the fourth industrial revolution (4IR) or Industry 4.0. |

| 6. | Title | SPECIAL SECTION ON ADVANCED INTERNET OF THINGS FOR SMART CYBER-PHYSICAL INFRASTRUCTURE SYSTEMS. |
|---|---|---|
| | Problem | The paper addresses the challenge of remote skin disease diagnosis using IoT technologies, focusing on skin condition classification |
| | Proposed Solution | The proposed solution involves a dynamic AI model configuration supported IoT-Fog-Cloud remote diagnosis architecture with hardware examples. |
| | Method | The research methodology includes reviewing existing methods, analyzing datasets, defining evaluation parameters, and evaluating outcomes of different classification models. |
| | Result | The evaluation shows that the proposed TEMCM model outperforms other models for skin disease detection, achieving better performance. |
| | End-Product | The end-product of the research is a proposed IoT-led remote diagnosis system architecture for skin disease detection. |
| | Conclusion | The paper provides a comprehensive evaluation of machine learning models for skin disease detection, focusing on fairness and unified comparisons, enhancing the understanding of the effectiveness of different models. |

| 7. | Title | Identification and Classification of Melanoma Using Deep Learning Algorithm |
|---|---|---|
| | Problem | Melanoma, the most dangerous skin cancer, often leads to death if not detected early |
| | Proposed Solution | Utilization of a deep learning-based model with transfer learning using the inception v3 model for melanoma classification. |
| | Method | Utilization of Convolutional Neural Networking (CNN) for accurate lesion classification. |
| | Result | The model successfully distinguished between melanoma and non-melanoma (nevus and seborrheic keratosis) lesions with a satisfactory level of prediction. |
| | End-Product | The system can be used by individuals to detect and distinguish between melanoma and non-melanoma lesions by providing a dermoscopic image of their skin lesion, with results generated within 5 minutes. |
| | Conclusion | The paper successfully addresses the critical issue of melanoma detection using deep learning algorithms, achieving high accuracy rates in classification tasks. |

| 8. | Title | Targeted Ensemble Machine Classification Approach for Supporting IoT Enabled Skin Disease Detection |
|---|---|---|
| | Problem | The paper addresses the challenge of remote skin disease diagnosis using IoT technologies, focusing on skin condition classification. |
| | Proposed Solution | The proposed solution involves a dynamic AI model configuration supported IoT-Fog-Cloud remote diagnosis architecture with hardware examples. |
| | Method | The research methodology includes reviewing existing methods, evaluating machine learning models using the HAM10000 dataset, and proposing a two-phase classification process. |
| | Result | Evaluation of Deep Learning models like VGG16, Inception, Xception, MobileNet, ResNet50, and DenseNet161 showed improved performance for skin disease detection. |
| | End-Product | The end-product is a framework for IoT-led remote skin disease diagnosis applications, integrating image-based disease recognition models with IoT devices and data management systems. |
| | Conclusion | The paper provides a comprehensive evaluation of machine learning models for skin disease detection, offering a novel classification approach and a dynamic AI model configuration for remote diagnosis. The use of standardized datasets and cross-validation enhances the credibility of the research findings. The proposed TEMCM model shows promise for improving accuracy in skin disease classification, addressing a critical need in healthcare applications. |

| 9. | Title | Studies on Different CNN Algorithms for Face Skin Disease Classification Based on Clinical Images |
|---|---|---|
| | Problem | Skin problems can lead to physical and psychological issues, especially for those with facial skin conditions. The challenge lies in accurately classifying common facial skin diseases using clinical images. |
| | Proposed Solution | Utilizing convolutional neural networks (CNNs) to classify six common skin diseases based on clinical facial images, leveraging transfer learning to enhance model performance. |
| | Method | Constructed a dataset with 2,656 facial images from Xiangya-Derm for training and testing different CNN algorithms. Utilized transfer learning by pretraining models with data from other body parts to improve classification accuracy. |
| | Result | Achieved high recall rates for diseases like LE, BCC, and SK using the best model, with mean recall and precision reaching 77.0% and 70.8% respectively. Transfer learning models outperformed those trained solely on facial images. |
| | End-Product | The study resulted in models capable of accurately classifying common facial skin diseases based on clinical images, showcasing the potential of CNNs in dermatology. |
| | Conclusion | The study demonstrates the effectiveness of CNNs in recognizing facial skin diseases, highlighting the importance of utilizing transfer learning for improved classification accuracy. However, further enhancements are needed to boost overall model performance for practical daily-life applications |

| 10. | Title | Skin Lesion Classification Using Convolutional Neural Network With Novel Regularizer |
|---|---|---|
| | Problem | Skin cancer diagnosis is primarily visual and involves various stages like clinical screening, dermoscopic analysis, histopathological assessment, and biopsy, which can be challenging due to fine-grained differences in lesion appearance. |
| | Proposed Solution | The paper proposes a new prediction model based on a novel regularizer technique to classify skin lesions into benign or malignant categories, achieving an average accuracy of 97.49% |
| | Method | The research utilizes a deep Convolutional Neural Network (CNN) with a novel regularizer to differentiate between benign and malignant skin lesions, focusing on melanoma, solar lentigo, and seborrheic keratosis. |
| | Result | The proposed model outperformed existing algorithms, achieving better Area Under the Curve (AUC) values for various lesion differentiations, showcasing its superiority in skin lesion classification. |
| | End-Product | The end-product of this research is a highly accurate binary classifier that can assist medical practitioners in classifying skin lesions with a high degree of accuracy. |
| | Conclusion | The proposed regularizer technique based on the standard deviation of the weight matrix of the classifier effectively controls the complexity of the model, leading to superior classification results compared to existing methods |