**ChickCheck : Chicken Disease Detection Application**

**Product Capstone**

| **Team ID** | **:** | **C241-PS126** |
| --- | --- | --- |
| **Selected Themes/Case** | **:** | Smart Agri-Fishery Solution: Agrotech and Fisheries Technology Integration |
| **Mentor Name** | **:** | **[Maichel Yunarto Budiman],** [4 June 2024 20.00 WIB]  **[Cindy Himawan],** [8 June 2024 10.00 WIB] |
| **Member Name** | **:** |  |

1. M014D4KX2588 – Kadek Swasty Maha Rani – Universitas Udayana - ML - [Active]
2. M014D4KY2680 – I Kadek Widi Adnyana – Universitas Udayana - ML - [Active]
3. M204D4KX2827 – Shela Atya Mitasya – Universitas Esa Unggul - ML - [Active]
4. C524D4KY1051 – Muhammad Luthfi Al-Redia – Politeknik Negeri Banjarmasin - CC - [Active]
5. C009D4KX1044 – Fitri Khadijah Syahrir – Universitas Gunadarma - CC - [Active]
6. A298D4KY4174 – Komang Harry Sudana – Universitas Pendidikan Ganesha - MD - [Active]
7. A298D4KY4199 – Putu Adi Sastrawan – Universitas Pendidikan Ganesha - MD - [Active]

**BACKGROUNDER:**

1. Machine Learning: Developed a model using TensorFlow, which utilises Xception transfer learning techniques to detect chicken disease types, with 4 categories namely healthy chickens, Coccidiosis, Newcastle Disease, and Salmonella. The collected and sorted datasets were put into Google Drive. To improve the generalisability of the model, the dataset was processed with ImageDataGenerator. Transfer learning with Xception benefits our chicken disease detection model by utilising pre-trained knowledge for efficient training. Xception's extensive feature extraction capabilities improve accuracy, requiring less labelled data. It excels at recognising complex patterns, making it an ideal foundation for chicken disease type evaluation in our ChickCheck app.
2. Mobile Development: Android mobile application developed using Kotlin to assist farmers in diagnosing chicken diseases. The app employs the Repository pattern for its architecture and Hilt for dependency injection. Core functionalities include using CameraX to capture images of chicken feces and scanning these images through a machine learning API. Additionally, the app leverages Google Location Nearby Place to help users find the nearest veterinary services. The app also provides educational articles about common chicken diseases to inform users.
3. Cloud Computing: Backend-service API using Node.js and Hapi as a framework Node.js. Integration with Machine Learning using Tensorflow JS to load the model, this model processes images after sent from Android. Using Cloud Run to deploy the backend application in the Google Cloud Platform and using Cloud Storage Bucket to store image after scanning and machine learning model. Using Firestore to store user data, scan history and articles.

**PROJECT STATUS** (Select One)**:**

100% Completed based on the Project Plan

**SCREENSHOTS/DEMO VIDEO:**

[ChickCheck-Demo Project](https://drive.google.com/file/d/1EVf0JtT1FZ8wq-OKTl6Kos2oDxy-27O6/view?usp=sharing)

**DATASET LINK:**

[ChickCheck-Dataset](https://drive.google.com/drive/folders/1qziE3ZCPLCgeWxBJC_rVUKc9wOwkZqN0?usp=sharing)

**DEPLOYED LINK:**

[Cloud Computing API](https://chickcheck-api-srcvmjwrfa-et.a.run.app/api/)

[ChickCheck APK](https://github.com/ChickCheckTeam/ChickCheck-MD/releases/download/v1.0.0-alpha/app-debug.apk)

[Machine Learning Notebook](https://colab.research.google.com/drive/1jiY9-tWijQXmTB24KTiV6eQ9AbD2rnRN?usp=sharing)

**GITHUB REPO LINK:**

[ChickCheck-Github](https://github.com/ChickCheckTeam)

**10-MIN VIDEO PRESENTATION LINK:**

[Video Presentation](https://youtu.be/lwzKh_nkHpc)

**SLIDE PRESENTATION LINK:**

[ChickCheck-Slide Presentation](https://docs.google.com/presentation/d/1ci4aKKSsPiwJXbMnRsYhNk7pkAYplq2h/edit?usp=drive_link&ouid=115117777948288277668&rtpof=true&sd=true)

**GO-TO-MARKET PROPOSAL**

* 1. **TARGET MARKET**
* The target market for our application is people in the age range 15-64 years, which is the productive age. Based on profession, we are targeting chicken farmers and the general public who keep chickens with market segmentation at traditional farmers living in urban areas.
* The target market we have defined requires the solution we offer based on the following:

1. Purpose-driven: This application aims to help chicken farmers control the health of their chickens.
2. Data-driven: Diseases that attack chickens and occur continuously can result in financial losses for farmers.
3. Government Reasoning: Our solution can improve financial and economic efficiency in farming sectors.
4. Stakeholders: This application is useful for chicken breeders, shops selling chicken health medicine
   1. **MARKETING STRATEGY**The following is our marketing strategy:

* Collaborating with partners such as the livestock department, shops selling chicken farming needs
* Hold promotions via social media, educational content
* Provides flexibility for users in providing feedback
  1. **COMPARISON WITH SIMILAR SERVICE/APPS (if any)**

We found two applications that have the same goal as our application, to find out the types of diseases that attack chickens, that is Pocket Guide for Poultry Diseases and Poultry Disease. The percentage similarity between the application and the one we created is approximately 30%. In the Pocket Guide for Poultry Diseases application, recognition of disease types is done manually by selecting the symptoms that occur in chickens and the Poultry Disease application only provides information related to chicken diseases. Meanwhile, in our application there are different ways of recognizing types of disease, that is by carrying out direct detection in chicken droppings using machine learning technology. We also provide recommendations for appropriate care for chickens based on detection results and the nearest place to purchase medicine or veterinary care.

* 1. **Sustainability: Profit Projection per Year**

| **No** | **Description** | **Total** |
| --- | --- | --- |
| **INCOME** | | |
| 1 | Cash | Rp 30.000.000 |
| 2 | Sales (penjualan) | Rp 43.400.000 |
| 3 | Project (proyek) | Rp 50.200.000 |
| 4 | Subscription (langganan) | Rp 27.000.000 |
| 5 | Grants (hibah) | Rp 20.000.000 |
| 6 | Soft Loan (pinjaman) | Rp 10.000.000 |
| **Total Income (A)** | | **Rp 180.600.000** |
| **EXPENSES** | | |
| **A** | **Additional Budget for Team Salary** |  |
| 1 | Salary for 7 people | Rp 49.000.000 |
| **B** | **Additional Budget for Research/Ops** |  |
| 3 | Buying/renting things, Data collection, Prototyping, Transportation Expenses, Additional salary for external experts, observers, and respondents | Rp 60.000.000 |
| 4 | Legalities, patent/copyright, registration, and product certification | Rp 3.000.000 |
| **C** | **Marketing and Sales** |  |
| 5 | Promotion, Digital marketing, and Event | Rp 10.000.000 |
| 6 | Sales Team Expense and Market Research | Rp 10.000.000 |
| **Total Expenses (B)** | | **Rp 132.000.000** |
| **Total Revenue (A-B)** | | **Rp 48.600.000** |

* 1. **SWOT Analysis of the project**
* **Strengths**

1. Classification of disease types powered by ML technology
2. Providing disease management solutions. We provide appropriate treatment solutions and treatment recommendations as well as the closest place to purchase medicine or consultations related to livestock

* **Weaknesses**

1. Further research is needed regarding external factors that affect the detection results. Our detection of chicken diseases is based on chicken droppings, so the condition of the chicken droppings may experience changes that can affect the accuracy of detection

* **Opportunities**

1. Few competitors offer similar features, more competitors are focusing on chicken rearing management features
2. Helps maintain farm stability. Maintaining chicken health will help control the stability of the livestock business.

* **Threats**

1. It is possible that farmers as the target market are less technologically literate. One of the target markets we are targeting is also traditional or home-based chicken breeders, so this condition may occur.

**MENTORING REMARK(S), IF ANY:**

Business/Commerce/Startup advisor:

1. Determine market segmentation according to the solution provided
2. Presenting a well-packaged solution for users, ensuring that the offered solution can be used without limitations and does not further complicate things for the user.
3. Given that disease detection in chickens is based on their droppings, which may be influenced by other factors, it is advisable to add a feature for initial selection of chickens showing symptoms of the disease. Subsequently, this detection system can be used as a reinforcement analysis.

Machine Learning advisor:

1. Pay attention to the distribution of data used for training, validation and test
2. Treat the same preprocessing stages on test data as used on training data, because the condition of the data given during train is what the model understands.

**Did the implemented capstone project differ from the original plan, and if so, how did these changes impact the project's success and outcomes?**There are several changes from the original plan, including the following:

1. The deployment process of the machine learning model is conducted in a cloud computing environment, so that our model is converted into TensorFlow.Js. Changes in deployment management aim to shorten the response flow to detection results and to ensure that the application is not burdened by the model's considerable size.
2. Our mobile development team has made a slight deviation from our original plan. Instead of using a Room database to store the history of scanned images, we are now storing this data on our cloud server. This approach reduces the burden on the device, improving performance and efficiency.