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Breast Cancer Screening Application based on Android with the Certainty Factor Method

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Abstract

According to Globocan records, in Indonesia in 2020 there were 396.314 new cancer cases. And 234.511 people were declared dead. Women are a group with a high risk of developing cancer. Based on records, there were 65,858 cases of breast cancer and 36.633 cases of cervical cancer. If cancer is detected at an early stage, this can increase the chance of cure to 80-90%. Early detection of cancer can be done using several methods, for example, for breast cancer, the method of checking can be using the SADANIS (Clinical Breast Examination) and SADARI (Self Breast Examination) methods. In this research, a mobile application will be developed that can be used as a guide in carrying out early cancer detection independently. The early detection system uses an Android-based expert system and certainty factor method. The case study in this research is on breast cancer. Based on the results of accuracy testing with expert diagnosis as a reference, an accuracy value of 90% was obtained. The inaccuracy of this expert system is 10% which can be caused by several possibilities, namely the expert's subjectivity in providing confidence values for disease symptoms or the small number of symptoms entered.

Keywords: *Breast Cancer Screening*

1. Introduction

Globocan in 2020 reported 396,314 new cases of cancer with 234,511 deaths [1]. Women are a group with a high risk of developing cancer, with 65,858 cases of breast cancer recorded, and 36,633 cases of cervical cancer [2]. Cancer that is found at an earlier stage is believed to increase the chances of recovery by 80-90%. One of the benefits is through early detection. Early detection of cancer can be done using several methods, for example, for breast cancer, the screening method can use the SADANIS (Clinical Breast Examination) and SADARI (Self Breast Examination) methods [3][4].

Many cancer patients seek treatment or visit health centers/hospitals in conditions that are already at an advanced stage, so the medical efforts made are not optimal and 60% of these patients die [5]. Therefore, it is still very necessary to strengthen promotional efforts in the community regarding the dissemination of cancer information [6].

Cancer is synonymous with the uncontrolled growth of abnormal cells in the body [8]. According to experts, one of the causes of the growth of cancer cells is because the cells experience genetic damage which can be caused by exposure to carcinogenic substances, such as radiation, carcinogenic chemicals, or other environmental factors. This genetic damage then causes mutations in certain genes that control cell growth [9].

Cancer cells that develop progressively can penetrate the normal boundaries of tissue, spreading to areas far from their original location (metastasis) [10]. Normally the body has a mechanism for destroying these abnormal cells [11]. However, if this mechanism fails, the abnormal cells will grow uncontrollably and will damage the cells around them. Factors that can trigger the growth of cancer cells vary, depending on the type of cancer [12].

Symptoms that arise due to cancer also vary, depending on the type of cancer and the body organs affected. Some complaints that cancer sufferers often experience are: lumps appearing, pain in one part of the body, pale, weak and tired, drastic weight loss, problems with defecation or urination, chronic cough, bruising, and spontaneous bleeding. and other parts [13].

In several developed countries, as part of cancer management, a screening system is implemented that is generally accessible [14]. Each year, the American Cancer Society publishes a summary of its guidelines for early detection of cancer, data and trends in cancer screening rates, and specific issues related to cancer screening [15]. The American Cancer Society ascertains the utilization of cancer screening for men and women and about men's and women's compliance with several recommended screening tests [16].

Based on the problems described above, the author conducted research on application design for Android-based breast cancer screening using the certainty factor method [17]. Breast cancer forms in breast tissue [18]. Breast cancer occurs when cells in the tissue in the breast grow uncontrollably and take over healthy breast tissue and its surroundings [19]. Breast cancer can form in the glands that produce milk (lobules) or in the ducts (ducts) that carry milk from the glands to the nipple [20]. Cancer can also form in fatty tissue or connective tissue in the breast. The majority of breast cancer occurs in women, although there is also breast cancer that attacks men.

Breast cancer is divided into many types:

a. Ductal carcinoma in situ (DCIS)
   DCIS grows in the mammary gland but does not spread to the surrounding tissue. DCIS is an early-stage cancer that is easy to treat. However, DCIS can spread to surrounding tissue if not treated immediately.
b. Lobular carcinoma in situ (LCIS)
   LCIS is a cancer that grows in the milk-producing glands. Just like ductal carcinoma in situ, this type of cancer does not spread to surrounding tissue. However, LCIS in one breast can increase the risk of cancer forming in both breasts.
c. Invasive ductal carcinoma (IDC)
   IDC is a type of breast cancer that grows in the ducts and can spread to surrounding tissue and can even spread to other areas of the body. IDC occurs in 70–80% of breast cancer cases.
d. Invasive lobular carcinoma (ILC)
   ILC is a cancer that initially grows in the mammary glands but then spreads to the surrounding tissue. This type of cancer can also spread through the blood and lymph channels to other parts of the body. ILC occurs in 10% of breast cancer cases.

Apart from the types of breast cancer above, several types of breast cancer are rare, namely:

a. Angiosarcoma, which is a type of cancer that grows in the blood vessels and lymph channels in the breast.
b. Phyllodes tumor, which is a type of cancer that grows in the connective tissue of the breast.
c. Inflammatory breast cancer (IBC), which is a type of breast cancer that can grow quickly and block the lymph channels, making the breasts inflamed, reddish, and swollen like they are infected.
d. Triple-negative breast cancer, which is a type of breast cancer that is difficult to treat because it does not show the presence of the estrogen hormone receptor (ER), progesterone hormone receptor (PR), and HER-2 protein receptor, on cancer tissue examination.

Breast cancer in the early stages is difficult to detect because it is still small. Usually, a new lump can be palpated if it is large enough [21]. However, what must be ensured is that not all lumps in the breast are cancer. Therefore, it is necessary to carry out an early and independent examination to determine whether the lump is inflammatory, tumor, or cancer. So far, it is not known what causes cancer cells to grow in the breast. However, experts believe that several factors can put a person at risk, including being overweight, menstruating at a very young age, and a history of other family members with cancer.

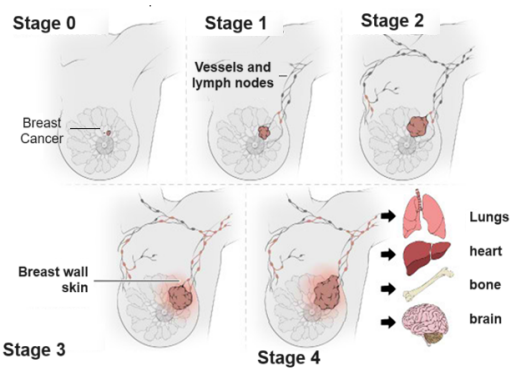

Figure 1. Breast Cancer Stages

The following is a general description of the condition of cancer at each stage:

a. Stage 0: At this stage, the lump that appears in the breast is small, so you can't even feel it when you touch it with your hand. Lumps can be seen using a mammography tool. Abnormal cells have not spread to surrounding tissue. With surgery to remove cancer cells, the chance of cure is high.
b. Stage I: At this stage, you can feel the lump yourself because its size is starting to increase. There has been no spread to other organs. The tumor size is also still small. The patient's condition (prognosis) is still better.
c. Stage II: At this stage, the cancer is larger, visually a lump can be seen and, the cancer cells may also have spread to the surrounding tissue or lymph nodes. If the cancer is large, surgery to remove the tumor must be performed. In this condition, it is still possible for sufferers to recover.
d. Stage III: At this stage, the cancer has spread to surrounding tissue or to the lymph nodes. There are already other symptoms such as feeling hot or painful when touched and other symptoms.
e. Stage IV: At this stage, the cancer has spread to other organs far from its original location, such as the lungs, liver, bones, or brain. The prognosis at this stage is generally lower, and the goals of treatment focus solely on managing symptoms and improving the patient's quality of life [10].

Breast cancer treatment can be done in several ways, depending on the patient's condition and the type of breast cancer. Treatment efforts include: radiation therapy, hormones, chemotherapy, or surgery (mastectomy). Breast cancer can be prevented by undergoing breast examinations independently or by medical staff. Examinations must be carried out regularly if you are at risk of developing breast cancer. Screening mammography is also recommended for early detection of breast cancer. This screening is carried out every 1-2 years for women starting at the age of 40 years. In people with risk factors, this screening can be done before the age of 40 years [22].

Apart from undergoing routine examinations, it is also recommended to eat a healthy diet, exercise regularly, maintain an ideal body weight, not smoke, and not consume alcoholic drinks. In addition, consult your doctor first before undergoing postmenopausal hormone replacement therapy. The difference between breast tumors and breast cancer can be seen in several aspects, namely the speed of growth, characteristics of the lump, and the texture of the skin around the breast. The following is an explanation of each:

a. From the Speed of Growth
   The difference between benign breast tumors (fibroadenoma mammae/FAM, fibrocystic, and breast cysts) and breast cancer can first be seen from the speed of growth. Tumors are abnormal tissues that are benign so they do not grow quickly and have relatively the same size from time to time. In contrast to benign tumors, cancer is a malignant tumor so it can grow aggressively, and can even spread to other body tissues.

b. From the Symptoms
The difference between breast tumors and breast cancer can also be known through the symptoms. Apart from a palpable lump in the breast, benign breast tumors usually do not cause any special symptoms, so the sufferer tends to go unnoticed. Lumps caused by benign breast tumors can also shrink or disappear by themselves. On the other hand, breast cancer can cause initial symptoms in the form of changes in the size, shape, and appearance of the breasts, discharge from the nipples, and swollen lymph nodes around the armpits.

c. From the Pain
The difference between a tumor and breast cancer can also be seen from the presence or absence of pain when the lump is touched. Generally, benign breast tumors cause pain when touched or touched. In contrast to benign breast tumors, lumps caused by breast cancer often do not cause pain. However, if breast cancer has spread and is pressing on the surrounding tissue, this condition can cause painful symptoms.

d. From the Characteristics of the Lumps
Generally, the shape and edges of benign tumor lumps in the breast can be touched with the hands and felt clearly. These benign tumor lumps also have a rubbery or soft texture and can be moved easily because they are not attached to the surrounding tissue. Meanwhile, the edges of lumps caused by breast cancer tend to feel unclear and have an uneven surface. The lump is also harder in texture and difficult to move because it is tightly attached to the breast tissue.

e. From the texture of the skin around the breasts
The next difference between tumors and breast cancer can be seen in the structure of the skin around the breast. Benign breast tumors generally do not cause changes in the shape or texture of the skin of the breast. On the other hand, breast cancer can cause the pores of the breast skin to widen, making the texture resemble orange peel. Apart from that, other symptoms of breast cancer include sores on the breast that do not heal and there is a kind of depression or pulling on the skin of the breast.

2. Research Method

This research aims to design an Android-based application that can be used for cancer screening. Screening that can be carried out later includes breast and cervical cancer. The main pillar of the Android application that will be developed is a rule-based expert system module using a knowledge factor. An overview of an rule diagram system is shown in Figure 2.

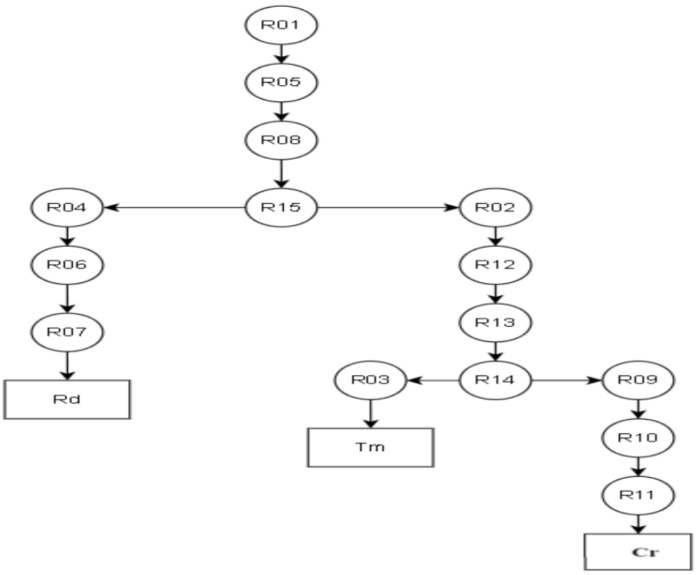

Figure 2. Rule diagram system

The screening system is designed to be able to distinguish symptoms of inflammation, tumors or cancer. Of the 15 existing symptoms, the complete symptom mapping is shown in Table 1.

Table 1. Rules of Symptom

Rule	Symptom	Inflammation	Tumors	Cancer

R01	There is a lump that appears in the breast	√	√	√
R02	The lump has clear boundaries	-	√	√
R03	The lump can be moved, not tied to the surrounding tissue	-	√	-
R04	There is no change in the shape or texture of the skin on the breast	√	√	-
R05	Changes in breast shape or size	√	√	√
R06	The breast skin is reddish	√	-	-
R07	Unusual pain in the breast	√	√	-
R08	Feels warm to the touch	√	√	√
R09	There is a hardening, or thickening of the skin that is similar to orange peel	-	-	√
R10	The breast nipple is retracted (inward)	-	-	√
R11	Unusual swelling or lump in the armpit area	-	-	√
R12	Persistent burning sensation or strange sensation in the breasts	-	√	√
R13	If suddenly the bra no longer fits like before	-	√	√
R14	Blood vessels appear more clearly	-	√	√
R15	Fluid coming out of the breast nipple	√	√	√

Tabel 2. Tabel level of confidence

Level of Confidence	Level of Confidence Value
Very confident	1
Certain	0.8
Sure enough	0.6
Not sure	0.4
Very Unsure	0.2
Don't know	0

In implementing an expert system using the Certainty Factor method, a knowledge base is needed by applying the MB and MD values or the level of expert confidence and uncertainty.

Table 3. Disease Acquisition Table

Rule	Symptom	Inflammation	Tumors	Cancer
R01	There is a lump that appears on the breast	1	1	1
R02	The lump has clear boundaries	0	0.8	0.8
R03	The lump can be moved, not tied to the surrounding tissue	0	1	0.2
R04	There is no change in the shape or texture of the skin on the breast	0.8	0.8	0.2
R05	Changes in breast shape or size	0.4	0.6	0.8
R06	The breast skin is reddish	0.8	0.8	0
R07	Unusual pain in the breast		0.8	0.6
R08	Feels warm to the touch	0.6	0.6	0.4
R09	There is a hardening, or thickening of the skin that is similar to orange peel	0	0.2	0.8
R10	The breast nipple is retracted (inward)	0	0	0.8

R11	Unusual swelling or lump in the armpit area	0	0	0.8
R12	Persistent burning sensation or strange sensation in the breasts	0	0.4	0.8
R13	If suddenly the bra no longer fits like before	0	0.6	0.8
R14	Blood vessels appear more clearly	0	0.6	0.8
R15	Fluid coming out of the breast nipple	0.6	0.6	0.6

The certainty factor (CF) in this system is used to deal with the problem of uncertainty in answers. An expert (for example a doctor) often analyzes existing information with expressions of uncertainty, to accommodate this using a certainty factor (CF) to indicate the level of expert confidence in the problem being faced. The certainty factor states confidence in an event (fact or hypothesis) based on evidence or expert assessment [23]. The certainty factor uses a value to assume the degree of confidence an expert has in data. In expressing the degree of certainty, the certainty factor assumes the degree of certainty of an expert regarding data. The data in this case is symptom data that points to the symptoms of a particular cancer [24].

Calculation of the CF value of this symptom is the first step of the Certainty Factor method. Obtaining the CF value is done by subtracting the belief and uncertainty values for symptoms of a particular disease. These belief and disbelief values were obtained directly from experts. The equation can be seen in Equation 1.

$$CF(h, e) = MB(h, e) - MD(h, e) \quad (1)$$

CF (h,e) : certainty in a hypothesis h which is influenced by e as a symptom.
MB (h,e) : A measure of confidence in hypothesis h which is influenced by e as a symptom.
MD (h,e) : A measure of lack of confidence in hypothesis h which is influenced by e as a symptom.

The initial stage of research is carrying out analysis and design. This stage aims to obtain and understand the needs related to the application and show general abstractions to the user such as the functions in the Android application for cancer screening. The results of the analysis and requirements design. Then the results will be used as a benchmark for all features that will later be created and developed [25].

The next stage is implementation, the aim of which is to apply all the concepts that have been carried out in the previous chapter into a ready-to-use application. For this implementation, Java is used as the programming language in the Android Studio IDE. The stages of Android application implementation are shown in Figure 3.

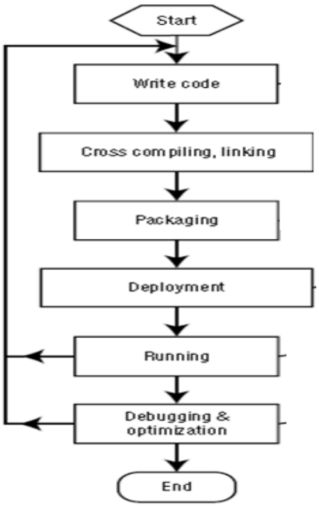

Figure 3. Android Application Development Process

After development, the testing phase is carried out. The purpose of carrying out the testing stage is to validate and verify the implementation results so that they can meet the needs that have been previously defined.

3. Results and Analysis

Starting with interviews with experts to obtain breast cancer data, followed by acquiring knowledge from interview data with experts, followed by procedures for implementing belief and uncertainty values or MB and MD with data to the next knowledge base is the implementation of the Certainty Factor method operation to obtain breast cancer criteria.

Interviews were conducted to obtain symptoms of breast cancer and inflammation for subsequent implementation into the expert system knowledge base. After conducting a direct interview with an anatomical pathology specialist, we continued with the acquisition of knowledge by applying several symptom rules as in Table 5.

Table 5. Accuracy Testing Results

P	Symptom															Disease		
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	Rd	Tm	Kr
1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	0
2	1	1	0	1	0	0	0	0	0	0	1	1	0	0	1	1	0	0
3	1	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	1	0
4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
5	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	1
6	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	1
7	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	1
8	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1
9	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	1
10	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	1
11	1	0	0	0	0	1	1	1	1	0	1	1	1	1	0	0	0	1
12	1	0	0	0	0	1	1	0	0	1	0	1	1	1	0	0	1	1
13	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	0	0	1
14	1	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0	1	0
15	1	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	1	0
16	1	0	0	0	0	1	1	1	0	1	1	1	1	1	0	0	1	0
17	1	0	1	1	0	1	1	1	1	1	0	0	1	1	0	0	0	1
18	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	1
19	1	0	0	0	0	1	1	1	1	0	1	1	1	1	0	0	0	1
20	1	0	0	0	1	1	1	1	1	0	0	0	0	0	1	0	0	1

P: Patient, Rd: Inflammation, Tm: Tumor, Cr: Cancer

From the test results with 20 data, 18 diagnoses were obtained that were in the expert's opinion, while 2 diagnoses were not appropriate. This discrepancy can be caused by factors, for example determining the weight of symptoms or others. From the testing table, several symptoms can be confirmed in the 3 diseases, namely the appearance of lumps. Meanwhile, if the lump does not have clear boundaries, it can be confirmed that it is inflammation. A lump with clear boundaries but which can be moved or is not attached to the surrounding tissue is usually a benign tumor. Meanwhile, if the lump causes the nipple to pull inward, then this is a symptom of cancer.

Research conducted by M Luke Marinovich used 113,818 screening examinations and 109,000 screening examinations (95.8%) met the criteria. The accuracy of this study was better because the screening used mammography photo data. So the screening carried out in this study only focuses on self-examination of the symptoms felt by the patient using the SADARI method (Breast Self-Examination).

Figure 4. User Interface of Breast Cancer Screening Application

This expert system interface was designed to prioritize comfort and ease of diagnosis. The Android application design can be seen in Figure 4.

4. Conclusion

The cancer diagnosis system built on Android is an effort for users to detect cancer or inflammation of the breast glands early. This system was built using the Certainty Factor method, by calculating the CF value interpreted by experts. Then the system will select the disease with the largest weight value, thus producing a percentage of the final system output.

Based on the test results, the accuracy of the system output with expert diagnosis is 90%. The inaccuracy of this expert system is 10% which can be caused by several possibilities, namely expert subjectivity in providing confidence values for disease symptoms because each expert's beliefs are different and input of factual symptom data that is not yet available in the system.

References

[1] H. Sung *et al.*, "Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries," *CA Cancer J Clin*, vol. 71, no. 3, 2021, doi: 10.3322/caac.21660.

[2] L. K. Choi, K. B. Rii, and H. W. Park, "K-Means and J48 Algorithms to Categorize Student Research Abstracts," *Int. J. Cyber IT Serv. Manag.*, vol. 3, no. 1, pp. 61–64, 2023.

[3] J. Kusumawaty, E. Noviati, I. Sukmawati, Y. Srinayanti, and Y. Rahayu, "Efektivitas Edukasi SADARI (Pemeriksaan Payudara Sendiri) Untuk Deteksi Dini Kanker Payudara," *ABDIMAS: Jurnal Pengabdian Masyarakat*, vol. 4, no. 1, 2021, doi: 10.35568/abdimas.v4i1.1177.

[4] D. Iriani, S. Parman, A. F. Hafizh, I. Rachmawati, and Y. A. Solihah, "Ambient Media Advertisement of Catur Insan Cendekia University to Improve Brand Awareness," *ADI J. Recent Innov.*, vol. 5, no. 1Sp, pp. 97–110, 2023.

[5] M. Dianatinasab *et al.*, "Heterogeneity in risk factors for ductal and lobular breast carcinomas: A case–control study," *Int J Cancer*, vol. 145, no. 11, 2019, doi: 10.1002/ijc.32182.

[6] U. Rahardja, Q. Aini, D. Manongga, I. Sembiring, and Y. P. A. Sanjaya, "Enhancing Machine Learning with Low-Cost P M2. 5 Air Quality Sensor Calibration using Image Processing," *APTISI Trans. Manag.*, vol. 7, no. 3, pp. 201–209, 2023.

[7] V. Galimberti, S. Monti, and M. G. Mastropasqua, "DCIS and LCIS are confusing and outdated terms. They should be abandoned infavor of ductal intraepithelial neoplasia (DIN) and lobular intraepithelial neoplasia (LIN)," *Breast*, vol. 22, no. 4, 2013, doi: 10.1016/j.breast.2013.04.010.

[8] R. D. Affandi, H. Pratiwi, and M. I. Sa'ad, "Application of the SMARTER Method in Determining the Whitening of Study Permits and Teacher Study Tasks," *Aptisi Trans. Technopreneursh.*, vol. 5, no. 2, pp. 205–215, 2023.

[9] V. V. Febiandini and M. S. Sony, "Analysis of Public Administration Challenges in the Development of Artificial Intelligence Industry 4.0," *IAIC Trans. Sustain. Digit. Innov.*, vol. 4, no. 2, pp. 164–168, 2023.

[10] Q. Y. Zhao *et al.*, "Global histone modification profiling reveals the epigenomic dynamics during malignant transformation in a Four-Stage breast cancer model," *Clin Epigenetics*, vol. 8, no. 1, 2016, doi: 10.1186/s13148-016-0201-x.
[11] N. Ramadhona, A. A. Putri, and D. S. S. Wuisan, "Students' Opinions of the Use of Quipper School as an Online Learning Platform for Teaching English," Int. Trans. Educ. Technol., vol. 1, no. 1, pp. 35–41, 2022.
[12] A. S. Sembiring *et al.*, "Implementation of Certainty Factor Method for Expert System," in *Journal of Physics: Conference Series*, 2019. doi: 10.1088/1742-6596/1255/1/012065.
[13] R. Wang, Y. Zhu, X. Liu, X. Liao, J. He, and L. Niu, "The Clinicopathological features and survival outcomes of patients with different metastatic sites in stage IV breast cancer," *BMC Cancer*, vol. 19, no. 1, 2019, doi: 10.1186/s12885-019-6311-z.
[14] M. Luke Marinovich *et al.*, "Artificial intelligence (AI) to enhance breast cancer screening: protocol for population-based cohort study of cancer detection," *BMJ Open*, vol. 12, no. 1, 2022, doi: 10.1136/bmjopen-2021-054005.
[15] U. Rahardja, "Camera trap approaches using artificial intelligence and citizen science," Int. Trans. Artif. Intell., vol. 1, no. 1, pp. 71–83, 2022.
[16] M. Wahidin, R. Febrianti, F. Susanty, and S. R. Hasanah, "Twelve Years Implementation of Cervical and Breast Cancer Screening Program in Indonesia," Asian Pacific Journal of Cancer Prevention, vol. 23, no. 3, 2022, doi: 10.31557/APJCP.2022.23.3.829.
[17] J. Timbres et al., "DCIS and LCIS: Are the Risk Factors for Developing In Situ Breast Cancer Different?," Cancers (Basel), vol. 15, no. 17, 2023, doi: 10.3390/cancers15174397.
[18] U. Rahardja, Q. Aini, P. A. Sunarya, D. Manongga, and D. Julianingsih, "The Use of TensorFlow in Analyzing Air Quality Artificial Intelligence Predictions PM2. 5," Aptisi Trans. Technopreneursh., vol. 4, no. 3, pp. 313–324, 2022.
[19] American Cancer Society, "Understanding a Breast Cancer Diagnosis - Types of Breast Cancer Stages and Outlook (Prognosis)," American Cancer Society, 2017.
[20] S. Kosasi, U. Rahardja, I. D. A. E. Yuliani, R. Laipaka, B. Susilo, and H. Kikin, "IT Governance: Performance Assessment of Maturity Levels of Rural Banking Industry," in 2022 4th International Conference on Cybernetics and Intelligent System (ICORIS), IEEE, 2022, pp. 1–6.
[21] H. Kurniawati, "DETEKSI DINI KANKER PAYUDARA DENGAN SADARI DAN SADARNIS," BAKTIMU : Jurnal Pengabdian Kepada Masyarakat, vol. 3, no. 2, 2023, doi: 10.37874/bm.v3i2.821.
[22] U. Usanto, L. Nurlaela, A. Sopian, and F. Alfiah, "Umrah Registration System Using Extreme Programming Method Towards Worship Tourism," *Int. J. Cyber IT Serv. Manag.*, vol. 3, no. 1, pp. 22–31, 2023.
[23] A. V. Lænkholm, J. Hoffmann, and F. E. Rank, "Carcinoma in situ of the breast," Ugeskrift for Laeger, vol. 169, no. 37. 2007.
[24] A. Tanhueco and M. M. G. Youssef, "Inflammatory Breast Cancer in Men: A rare clinical case report and a literature review," Int J Surg Case Rep, vol. 80, 2021, doi: 10.1016/j.ijscr.2021.105696.
[25] U. Rahardja, "Blockchain Education: as a Challenge in the Academic Digitalization of Higher Education," IAIC Trans. Sustain. Digit. Innov., vol. 4, no. 1, pp. 62–69, 2022.