Software Project Management

FYP - PROJECT

NAME	ROLL NO
Muhammad Rohaan Khan	*BSSE / B / Sp-22 / 037*
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TEACHER SIGN :

Mam Arooj Abid

Question 1:

Ans). Business Case for Final Year Project

Project Title: Automated Lesion Boundary Segmentation for Early Skin Cancer Detection

1. Executive Summary

Skin cancer is one of the most prevalent forms of cancer globally, with millions of cases reported annually. Early detection is critical to improving survival rates and reducing treatment costs. Our Final Year Project proposes a cost-effective, AI-powered solution that automates the boundary segmentation of skin lesions to assist in early detection and diagnosis. This project aims to leverage deep learning techniques, specifically convolutional neural networks (CNNs), to accurately segment lesion areas in dermoscopic images, enabling faster, more consistent, and accessible diagnosis support for dermatologists and healthcare systems.

2. Problem Statement

Manual detection and analysis of skin lesions are time-consuming, require specialized dermatological expertise, and are prone to human error. In many rural and underdeveloped areas, access to experienced dermatologists is limited. Delays in diagnosis can lead to the progression of malignant melanoma and other skin cancers, reducing patient survival chances. There is a significant need for an automated, accurate, and accessible system to assist in the early identification of skin cancer.

3. Project Objectives

- To develop an AI-based system that performs automated lesion boundary segmentation from dermoscopic images.
- To increase the accuracy and speed of lesion detection, aiding dermatologists in early diagnosis.
- To provide a scalable solution that can be integrated into mobile and web health applications.
- To reduce diagnostic costs and make cancer screening more accessible, especially in low-resource settings.

4. Justification and Need

- **Rising Skin Cancer Rates:** The global increase in skin cancer cases highlights the need for preventive and diagnostic innovations.
- **Early Detection Saves Lives:** Studies show that early diagnosis can significantly improve treatment outcomes and survival rates.
- **Healthcare Accessibility:** This solution supports telemedicine and remote diagnostics, bridging gaps in areas lacking medical infrastructure.
- **Cost-Effective and Scalable:** Once trained, the AI model can be deployed widely at a low operational cost, serving both urban and remote populations.

→ FYP Project Charter:

Project Title: Automated Lesion Boundary Segmentation for Early Skin Cancer Detection

Date of Authorization: 1 April 2025
Project Start Date: 1 April 2025 **Projected Finish Date:** 10 Feb 2026

Key Schedule Milestones:
• Complete first version of the software by 1 July 2025
• Complete production version of the software by 1 Dec 2025

Budget Information: The firm has allocated $1/2 million for this project, and more funds are available if needed. Most costs for this project will be internal labor. All hardware will be outsourced.

Project Manager: Muhammad Rohaan Khan, (+92)0341-949-070, haadikhan819@gmail.com

Project Objectives: The project aims to develop software that automates the segmentation of lesion boundaries to aid in the early detection of skin cancer. The initiative builds on the momentum of an ongoing DNA-sequencing instrument project that has been active for three years, highlighting its significance to the company.
Specific Objectives:

- First Software Version: Deliver a working version of the software within four months (by 1 July 2025).
- Production Software Version: Launch a fully production-ready version within nine months (by 1 Dec 2025).

Main Project Success Criteria:

- The software must meet all written specifications.
- Comprehensive and thorough testing must be conducted according to approved test plans.
- The project must be completed on time.
- Final approval will be provided by the CEO (Ahsan Pervaiz Ilyaz), with significant input from other key stakeholders.

Approach:

Team Augmentation:

- Hire a technical replacement for the current Project Manager, Muhammad Rohaan Khan.
- Engage a part-time assistant immediately.

Planning and Management:

- Within One Month.
- Develop a detailed Work Breakdown Structure (WBS).
- Prepare a clear Scope Statement.
- Create a Gantt chart outlining all the work required to complete the project.

Hardware Upgrades:

- Purchase all necessary hardware upgrades within the first two months of the project.
- Progress and Monitoring:
- Hold weekly review meetings with both the core project team and the project sponsor to ensure that progress is continuously tracked against the schedule.

Software Testing:

- Implement and follow the approved test plans rigorously to ensure the highest quality assurance at each development stage.

Monitoring and Reviews:

- Conduct weekly progress review meetings with the core project team and the project sponsor to ensure steady progress.

ROLES AND RESPONSIBILITIES			
Name	**Role**	**Position**	**Contact Information**
Ahsan Pervaiz Ilyaz	Sponsor	CEO	ahsanpervaiz468@gmail.com
M.Rohaan Khan	Project Manager	Manager	haadikhan819@gmail.com
Susan Johnson	Team Member	DNA expert	nearson@dnaconsulting.com
Renyong Chi	Team Member	Testing expert	nearson@dnaconsulting.com
Erik Haus	Team Member	Programmer	rehi@dnaconsulting.com
Zarsha Nazim	Supervisor	Professor	zarshanazim32@gmail.com
Usman	Co-Supervisor	Full Stack developer	usmandevsink@gmail.pk
Sign-off:			
Ahsan Pervaiz ilyaz		*M.Rohaan Khan*	
Susan Johnson		*Renyong Chi*	
Erik Haus		*Zarsha Nazim*	
Usman			
Comments:			
"I want to be heavily involved in this profit. It is crucial to our company's success, and I expect everyone to help make it nicened." Ahsan Pervaiz Ilyaz.			
"The software test plans are complete and well documented. If anyone has questions, do not hesitate to contact me." -Renyong Chi			

Question 2:

Ans). To address and eliminate the defects in our FYP **"Automated Lesion Boundary Segmentation for Early Skin Cancer Detection"**, the most suitable Six Sigma approach would be **DMAIC (Define, Measure, Analyze, Improve, Control)**. This approach is specifically used for improving existing processes and eliminating defects, which aligns perfectly with the feedback we received after delivering the first two sprints.

Implementation of DMAIC in FYP:

1. Define:

We will clearly define the problems based on customer feedback. For example, the issues might include inaccurate segmentation results, slow processing speed, or poor user interface.

- **Objective**: Improve lesion boundary detection accuracy and system reliability.
- **Customer Requirements**: Accurate segmentation, fast response time, and ease of use.

2. Measure:

We will evaluate the current performance of the system using relevant metrics.

- **Metrics**: Dice coefficient, Jaccard Index, processing time, and number of false positives/negatives.
- **Data Collection**: Run the system on a standard dataset and record performance indicators.

3. Analyze:

Analyze the root causes of the defects found in the first two sprints.

- **Tools**: Fishbone diagram, 5 Whys, and Pareto analysis.
- **Example Findings**: Poor preprocessing, inadequate training data, or suboptimal model hyperparameters.

4. Improve:

Implement changes to eliminate the root causes of the defects.

- **Actions**:

1. Enhance image preprocessing techniques.
2. Retrain the model with more diverse and high-quality data.
3. Fine-tune hyperparameters.
4. Optimize algorithm performance and interface usability.

5. Control:

Establish controls to ensure the improvements are sustained throughout the rest of the project.

- **Methods**:

1. Regular code reviews and unit testing.
2. Validation checkpoints at the end of each sprint.
3. Use control charts to monitor model performance over time.

Question 3:

Ans). Cost Estimation for FYP: Automated Lesion Boundary Segmentation for Early Skin Cancer Detection

Cost Estimation Tools & Techniques: Bottom-Up Estimation

For this project, we will use the **Bottom-Up Estimation** technique. Given the detailed scope of our project ranging from data collection, preprocessing, model development, GUI integration, testing, and deployment it is most appropriate to estimate costs at the activity level and aggregate them for an accurate total. This approach is well-suited for projects with well-defined components like ours.

- ### Ground Rules and Assumptions:

To ensure consistent and reliable cost estimation, the following assumptions and ground rules have been established:

1. **Timeline:** The project duration is assumed to be **12 months**.
2. **Team Composition:** The development team includes:
    a. 2 Machine Learning Engineers.
    b. 1 Frontend Developer.
    c. 1 Backend Developer.
    d. 1 Medical Consultant (part-time).
    e. 1 Project Manager.
    f. 1 QA Engineer.
3. **Work Hours:** All full-time team members work **160 hours/month**.
4. **Tools:** Open-source libraries will be used where possible to reduce licensing costs (e.g., TensorFlow, PyTorch, OpenCV).
5. **Platform:** The system will be developed as a **web-based application** and deployed on a **cloud platform (e.g., AWS)**.
6. **Medical Datasets:** Publicly available datasets such as **ISIC** will be used for training/testing purposes.
7. **Testing Phase:** Includes both manual and automated testing.
8. **Inflation and Tax:** Not considered, assuming an academic/non-commercial budget.
9. **Cost Contingency:** An additional 10% buffer is added for unexpected expenses.

- ## Project Budget:

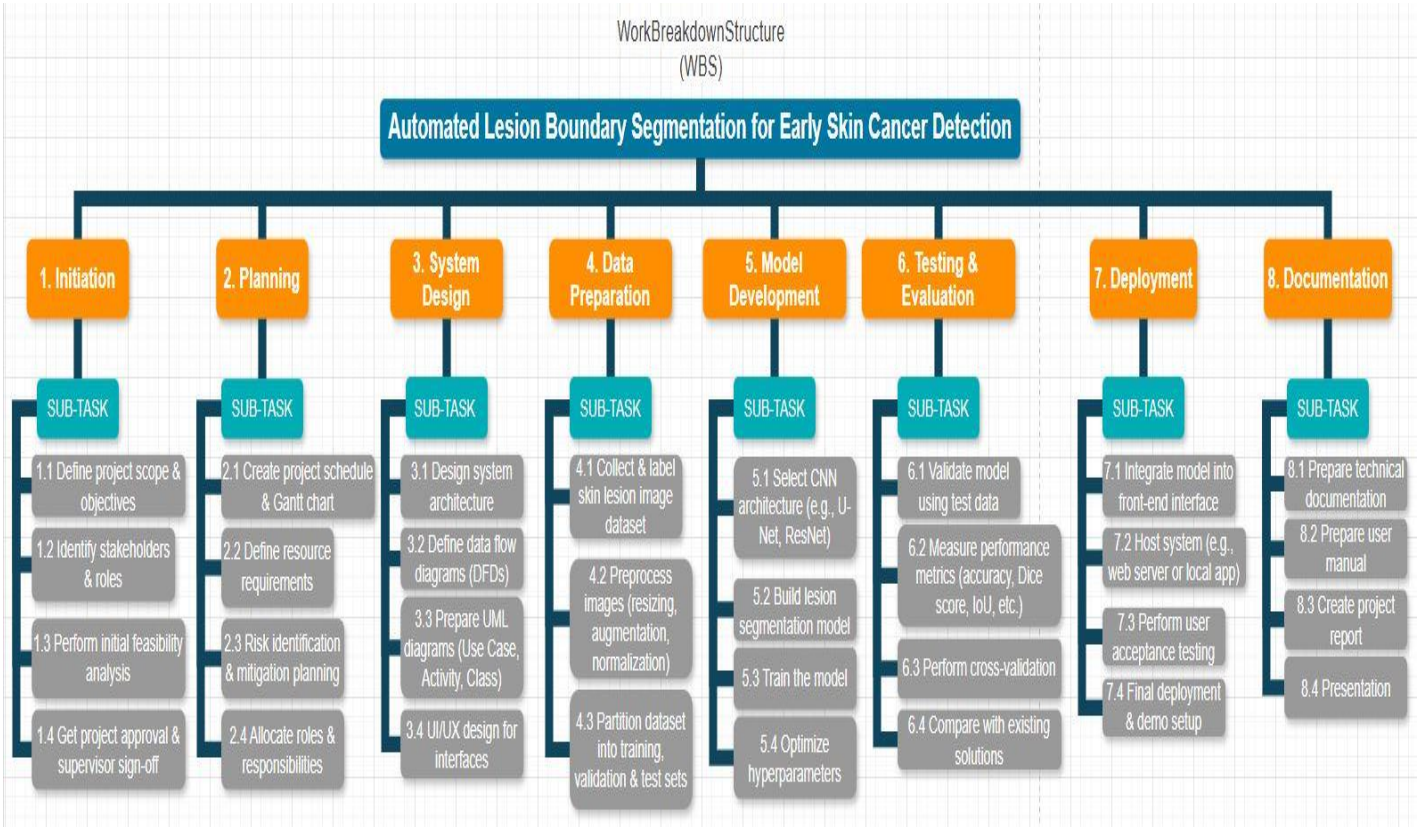
WBS Items	1	2	3	4	5	6	7	8	9	10	11	12	Total $
1. Project Management													
1.1 Project Manager	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	30,000
1.2 Project Team Members	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	48,000
2. Hardware													
2.1 Laptops / GPU	6,000												6,000
2.2 Cloud Servers	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	18,000
3. Software													
3.1 Licensed Tools			2,000										2,000
3.2 Model Development	5,000	5,000	10,000	10,000	10,000	10,000	5,000						55,000
4. Testing & Evaluation							2,000	5,000	5,000	5,000	5,000		27,000
5. Medical Consultation					2,500			2,500					5,000
6. Deployment									3,000	3,000	3,000	3,000	12,000
7. Documentation & Reports											2,500	2,500	5,000
8. Training & Support										2,500	2,500		5,000
9. Reserves (10%)													50,000
Total $	19,000	14,000	20,000	18,000	20,000	18,000	15,000	15,000	16,000	18,500	21,000	15,500	500,000

- ## Software Development Cost Estimates:

Labor Role	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	Calculations
Machine Learning Engineers	1600	$100	$160,000	1600 × 100
Developers	1000	$80	$80,000	1000 × 80
Project Manager	480	$90	$43,200	480 × 90
Medical Consultant	200	$150	$30,000	200 × 150
QA & Testing Engineers	400	$70	$28,000	400 × 70
Documentation & Support Team	320	$60	$19,200	320 × 60
Total Labor Estimate			**$360,400**	**Sum all above values**
2. Function Point Estimate	**Quantity**	**Conversion Factor**	**Function Points**	**Calculations**
External Inputs	8	4	32	8 × 4
External Interface Files	4	7	28	4 × 7
External Outputs	5	5	25	5 × 5
External Queries	6	4	24	6 × 4
Logical Internal Tables	6	10	60	6 × 10
Total Function Points			**169**	Sum above function point values
Python language equivalency value			46	From reference or tool

Estimated SLOC (Source Lines of Code)			7,774	169 × 46
Productivity × KSLOC^Penalty			28.7	3.13 × (7.774^1.072)
Total Labor Hours (27 hrs / function point)			4,563	27 × 169
Cost per labor hour			$120	From budget/industry average
Total Function Point Estimate			**$400,560**	4,563 × 120

- ## Work Breakdown Structure (WBS) by category:



- ## Cost Estimation for WBS Components:

WBS no.	Category	Task Description	Estimated Cost $	Cost Breakdown
1.0	Initiation	Project scope, feasibility, approval	2,000	Printing, meetings, documentation
2.0	Planning	Scheduling, risk plan, team roles	1,500	Project planner tools, printing
3.0	System Design	DFDs, UML, UI/UX design	3,000	Design tools (e.g., Figma), paper drafts
4.0	Data Preparation	Image collection, labeling, preprocessing	5,000	Internet, cloud storage, tools (Python libs)
5.0	Model Development	CNN model creation, training, tuning	10,000	GPU usage, Python libraries, Colab/Cloud fees
6.0	Testing & Evaluation	Validation, accuracy, comparison	4,000	Evaluation scripts, performance testing
7.0	Deployment	Interface, integration, hosting, demo	6,000	Hosting, domain (if web), deployment tools
8.0	Documentation	Final report, user manual, presentation	3,000	Printing, binding, PowerPoint license, etc.
Total			34,500	

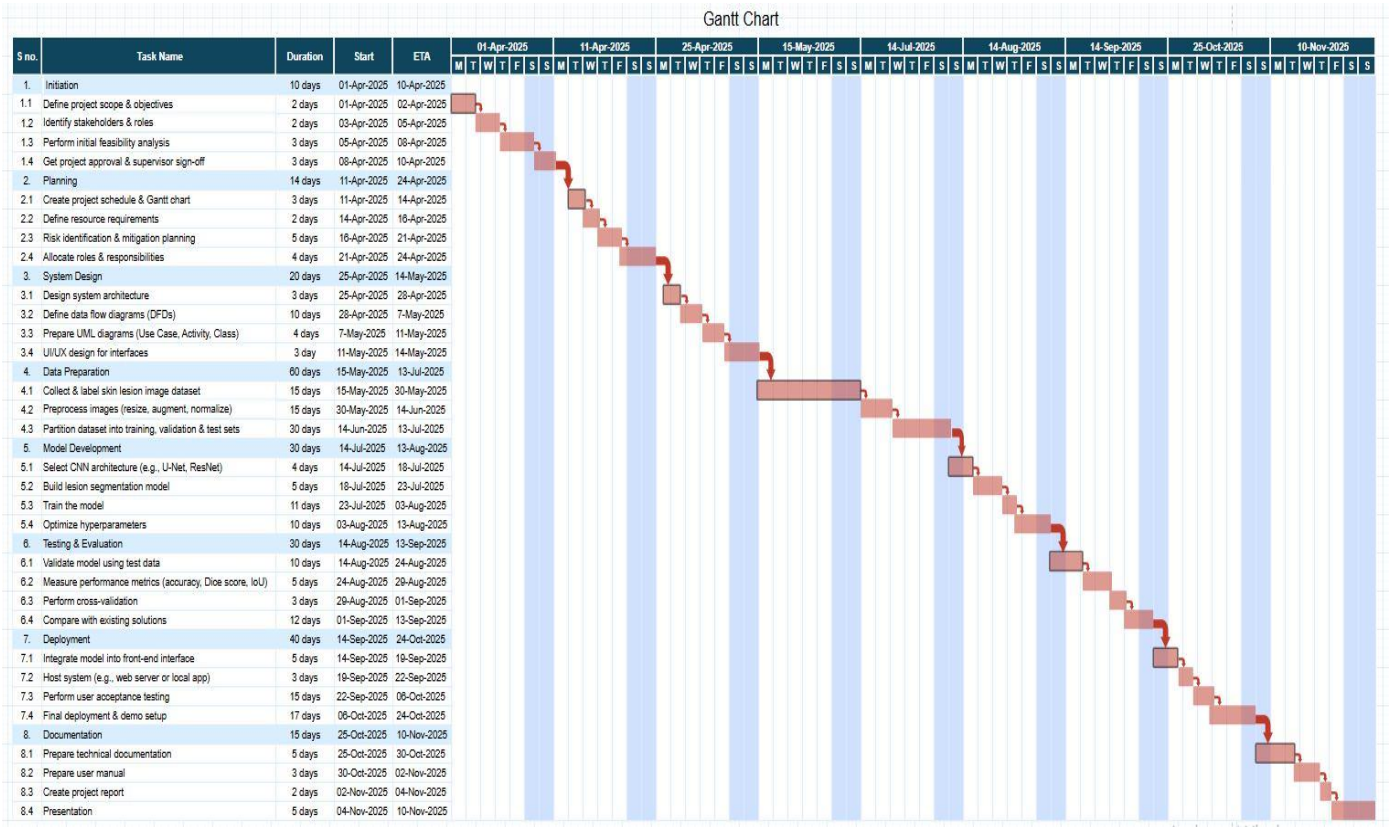
Question 4:

Ans).

- ## Phase-Based Work Breakdown Structure (WBS):

Phase	WBS no.	Task	Duration (Days)	Start Date	End Date
1. Initiation	1.1 – 1.4	Project scope, feasibility, stakeholders, approval	10	01-Apr-2025	10-Apr-2025
2. Planning	2.1 – 2.4	Scheduling, risk planning, resource allocation	14	11-Apr-2025	24-Apr-2025
3. Design	3.1 – 3.4	System architecture, DFDs, UML, UI/UX design	20	25-Apr-2025	14-May-2025
4. Data Preparation	4.1 – 4.3	Data collection, preprocessing, dataset splitting	60	15-May-2025	13-Jul-2025
5. Development	5.1 – 5.4	Model selection, building, training, tuning	30	14-Jul-2025	13-Aug-2025
6. Testing	6.1 – 6.4	Validation, metrics, evaluation, comparison	30	14-Aug-2025	13-Sep-2025
7. Deployment	7.1 – 7.4	Integration, hosting, testing, final demo	40	14-Sep-2025	24-Oct-2025
8. Documentation	8.1 – 8.4	Final report, user manual, presentation preparation	45	25-Oct-2025	09-Dec-2025
9. Buffer Time	---	Contingency and revision period	30	10-Dec-2025	10-Jan-2026
10. Final Review	---	Supervisor feedback, viva preparation, final edits	30	11-Jan-2026	10-Feb-2026

- ## Gantt chart:



S no.	Task Name	Duration	Start	ETA
1.	Initiation	10 days	01-Apr-2025	10-Apr-2025
1.1	Define project scope & objectives	2 days	01-Apr-2025	02-Apr-2025
1.2	Identify stakeholders & roles	2 days	03-Apr-2025	05-Apr-2025
1.3	Perform initial feasibility analysis	3 days	05-Apr-2025	08-Apr-2025
1.4	Get project approval & supervisor sign-off	3 days	08-Apr-2025	10-Apr-2025
2.	Planning	14 days	11-Apr-2025	24-Apr-2025
2.1	Create project schedule & Gantt chart	3 days	11-Apr-2025	14-Apr-2025
2.2	Define resource requirements	2 days	14-Apr-2025	16-Apr-2025
2.3	Risk identification & mitigation planning	5 days	16-Apr-2025	21-Apr-2025
2.4	Allocate roles & responsibilities	4 days	21-Apr-2025	24-Apr-2025
3.	System Design	20 days	25-Apr-2025	14-May-2025
3.1	Design system architecture	3 days	25-Apr-2025	28-Apr-2025
3.2	Define data flow diagrams (DFDs)	10 days	28-Apr-2025	7-May-2025
3.3	Prepare UML diagrams (Use Case, Activity, Class)	4 days	7-May-2025	11-May-2025
3.4	UI/UX design for interfaces	3 day	11-May-2025	14-May-2025
4.	Data Preparation	60 days	15-May-2025	13-Jul-2025
4.1	Collect & label skin lesion image dataset	15 days	15-May-2025	30-May-2025
4.2	Preprocess images (resize, augment, normalize)	15 days	30-May-2025	14-Jun-2025
4.3	Partition dataset into training, validation & test sets	30 days	14-Jun-2025	13-Jul-2025
5.	Model Development	30 days	14-Jul-2025	13-Aug-2025
5.1	Select CNN architecture (e.g., U-Net, ResNet)	4 days	14-Jul-2025	18-Jul-2025
5.2	Build lesion segmentation model	5 days	18-Jul-2025	23-Jul-2025
5.3	Train the model	11 days	23-Jul-2025	03-Aug-2025
5.4	Optimize hyperparameters	10 days	03-Aug-2025	13-Aug-2025
6.	Testing & Evaluation	30 days	14-Aug-2025	13-Sep-2025
6.1	Validate model using test data	10 days	14-Aug-2025	24-Aug-2025
6.2	Measure performance metrics (accuracy, Dice score, IoU)	5 days	24-Aug-2025	29-Aug-2025
6.3	Perform cross-validation	3 days	29-Aug-2025	01-Sep-2025
6.4	Compare with existing solutions	12 days	01-Sep-2025	13-Sep-2025
7.	Deployment	40 days	14-Sep-2025	24-Oct-2025
7.1	Integrate model into front-end interface	5 days	14-Sep-2025	19-Sep-2025
7.2	Host system (e.g., web server or local app)	3 days	19-Sep-2025	22-Sep-2025
7.3	Perform user acceptance testing	15 days	22-Sep-2025	06-Oct-2025
7.4	Final deployment & demo setup	17 days	06-Oct-2025	24-Oct-2025
8.	Documentation	15 days	25-Oct-2025	10-Nov-2025
8.1	Prepare technical documentation	5 days	25-Oct-2025	30-Oct-2025
8.2	Prepare user manual	3 days	30-Oct-2025	02-Nov-2025
8.3	Create project report	2 days	02-Nov-2025	04-Nov-2025
8.4	Presentation	5 days	04-Nov-2025	10-Nov-2025