

Ideation Phase
Brainstorm & Idea Prioritization Template


Date	18 October 2023
Team ID	PNT2022TMID592348
Project Name	Project - AI-Driven Optimization of 5G Resource Allocation for Network Efficiency
Maximum Marks	4 Marks

Brainstorm & Idea Prioritization Template:

The brainstorming map provided below outlines the structured approach and key steps for a project focused on AI-Driven 5G Resource Allocation. This map serves as a visual guide, helping to organize and plan the project effectively. It covers various essential phases, from data collection and preprocessing to model building and deployment, as well as user interface development and integration. The map assists in clarifying the project's objectives, activities, and potential challenges while maintaining a clear sequence of actions. It ensures that all critical aspects, from data analysis to user feedback and future enhancements, are considered in a well-structured and systematic manner.

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Template



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

🕒 10 minutes to prepare
🕒 1 hour to collaborate
👤 2-8 people recommended

➔

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article ➔

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problem statement

In the context of 5G network deployment in India, there exists a pressing challenge in optimizing resource allocation for enhanced network efficiency and quality of service. The problem revolves around determining the most effective allocation of resources based on Application Type, Signal Strength, Latency, Required Bandwidth, and Allocated Bandwidth within the spectrum of low-band, mid-band, and high-band (mm Wave) frequencies. The objective is to maximize network performance, throughput, and user experience while considering the trade-offs posed by varying frequency bands.

PROBLEM

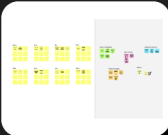
How might we [your problem statement]?

🧠

Key rules of brainstorming

To run a smooth and productive session

🗣️ Stay in topic.	💡 Encourage wild ideas.
🕒 Defer judgment.	👂 Listen to others.
🗣️ Go for volume.	👁️ If possible, be visual.



Need some inspiration?

See a finished version of this template to kickstart your work.

Open example ➔

Step-2: Brainstorm, Idea Listing and Grouping

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Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP
You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Vishnu

Import Python libraries like Pandas, NumPy, Matplotlib, Seaborn, Scikit-Learn for data analysis and machine learning.

Normalize or scale numerical features

Evaluate model performance using metrics like Mean Squared Error (MSE) or Root Mean Squared Error (RMSE).

Use Matplotlib, Seaborn, or other visualization libraries.

Design a user-friendly interface for resource allocation predictions

Transform or encode categorical variables as needed.

Decision Tree Regressor

Select the best-performing model for resource allocation prediction

Choose a web framework (Flask or Streamlit) for creating a user interface.

Deploy the model and user interface

Isha

Gather data related to 5G network parameters, application types, signal strength, latency, and bandwidth requirements

Implement strategies like removing outliers or transforming data

Logistic Regression

Also analyse the cross tab for more detailed information on each and every model built

Investigate model bias, variance, and accuracy

Create documentation detailing the project, data sources, methodologies, and user interface usage

Handle missing data if any.

Split data into training and testing sets

Train and fine-tune models using hyperparameter optimization techniques

Create visualizations to understand the relationships between input features and resource allocation

Invite users to interact with the interface and provide feedback

Adithya

Acquire datasets for low-band, mid-band, and high-band (mm Wave) frequencies

Identify and handle outliers in the dataset

Random Forest Regressor

Prepare the selected model for deployment

Continuously monitor the system's performance

Perform a final round of testing to ensure the system's stability and accuracy

Create relevant features based on network parameters, such as signal strength, latency, and bandwidth

Linear Regression

Assess the model's performance on test data

Implement input fields for application type, signal strength, latency, and required bandwidth

Use user feedback to make improvements and updates to the system

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Data Collection

Gather data related to 5G network parameters, application types, signal strength, latency, and bandwidth requirements.

Acquire datasets for low-band, mid-band, and high-band (mm Wave) frequencies.

Feature Engineering

Create relevant features based on network parameters, such as signal strength, latency, and bandwidth.

Transform or encode categorical variables as needed.

Handle missing data if any, using techniques like imputation

Importing Necessary Libraries

Import Python libraries like Pandas, NumPy, Matplotlib, Seaborn, Scikit-Learn for data analysis and machine learning.

Outlier Detection and Treatment

Identify and handle outliers in the dataset. You can use techniques like the Z-score or IQR method for outlier detections in the dataset.

Implement strategies like removing outliers or transforming data.

Data Preprocessing

Normalize or scale numerical features.

Split data into training and testing sets.

Performance Testing

Assess the model's performance on test data. Investigate model bias, variance, and accuracy.

Analyze the model's predictions and compare them to the actual resource allocations.

Model Building

Explore various machine learning regression algorithms as mentioned (Linear Regression, Decision Tree Regressor, Random Forest Regressor).

Train and fine-tune models using hyperparameter optimization techniques (e.g., GridSearchCV or RandomizedSearchCV).

Best Model Selection

Evaluate model performance using metrics like Mean Squared Error (MSE) or Root Mean Squared Error (RMSE).

Analyze the cross tab for more detailed information on each and every model built.

Select the best-performing model for resource allocation prediction.

Data Visualization

Create visualizations to understand the relationships between input features and resource allocation.

Use Matplotlib, Seaborn, or other visualization libraries.

Model Deployment

Prepare the selected model for deployment by saving the model and its necessary preprocessing steps (e.g., scalers, encoders).

Integration of Flask or streamlit

Choose a web framework like Flask or Streamlit for creating a user interface.

Creating User Interface

Design a user-friendly interface to allocate and access resources (e.g., input fields for application type, signal strength, latency, and required bandwidth) in real-time scenarios.

User Testing

Invite users to interact with the interface and provide feedback.

Deployment and Monitoring

Deploy the model and user interface to a web server or cloud platform.

Continuously monitor the system's performance and resource utilization.

Feedback Iteration

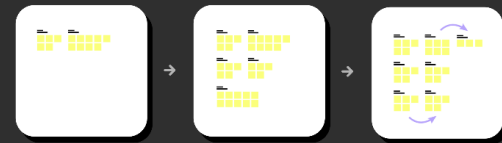
Use user feedback to make improvements and updates to the system, such as refining the model and the user interface.

Documentation

Create documentation outlining the project, data sources, methodologies, and user interface usage.

Final Testing

Perform a final round of testing to ensure the system's stability and accuracy.



Step-3: Idea Prioritization

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Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

🕒 20 minutes

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H** key on the keyboard.

