Here is the **complete, clear, beginner-friendly overview** of your **Skin Tone Based Dress Color Recommendation Project** — from start to finish.
This is the *exact workflow* you will follow.

🔥 📌 OVERALL PROCESS OF THE PROJECT

Below is the **full pipeline**, explained simply.

✅ 1. Collect Input Image

The user uploads or provides a face image.
Example: `face.jpg`

✅ 2. Detect the Face

Use **MediaPipe Face Detection** to automatically find the face area.

Purpose:

- Focus only on the face
- Avoid background colors

✅ 3. Extract Only the Skin Region

Use **color space filtering (YCrCb mask)** to isolate skin pixels.

Purpose:

- Remove hair, lips, eyes, background
- Get *only* skin pixels for accurate color

✅ 4. Find the Dominant Skin Color

Use **KMeans Clustering** on skin pixels.

Output:

- Skin color in **RGB**
- Skin color in **HEX**

Example:

RGB: [212, 165, 128]
HEX: #d4a580

This is your base skin tone.

✅ 5. Determine the Skin Undertone

We analyze the extracted color to find:

Warm Undertone

- More yellow/green
- More red + green

Cool Undertone

- More blue/pink
- Red + blue dominance

Neutral

- Balanced

This is done using simple color rules.

✅ 6. Classify Into a Color Season

Based on undertone + brightness:

Warm → Spring or Autumn

- Spring: light, fresh warm
- Autumn: deep, rich warm

Cool → Summer or Winter

- Summer: soft, pastel cool
- Winter: bold, strong cool

This is the step that stylists use.

✅ 7. Recommend Suitable Dress Colors

For each season, you return a list of colors.

Example for **Winter (Cool)**:

- Black
- White
- Emerald
- Royal Blue
- Cool Red
- Fuchsia

Example for **Autumn (Warm)**:

- Olive
- Mustard
- Rust
- Maroon
- Forest green

You can present:

- Color names
- HEX values
- Color blocks

✅ 8. (Optional) Analyze Dress Color in an Image

Advanced step:

- Extract dominant colors from the dress image
- Compare with recommended palette
- Tell if the dress matches the skin tone

(This can be added later.)

✅ 9. Display Results

Your system will show:

Skin Tone Results

- Dominant skin color
- Undertone type
- Seasonal type

Recommended Dress Colors

- Color names
- HEX codes
- Color swatches

🎯 Final Output Example

Skin Tone: #d4a580 (RGB: 212, 165, 128)

Undertone: Warm
Season: Autumn

Recommended Dress Colors:
- Olive Green (#808000)
- Rust (#b7410e)
- Mustard (#ffdb58)
- Brown (#654321)
- Forest Green (#228b22)

You can display this in:

- Console
- A simple GUI
- A Streamlit web app

🔥 This is the complete pipeline of the project.