sequenceDiagram  
 title Pro Mood Tracker - Key User Interaction Flows  
   
 actor User  
 participant UI as Mobile App UI  
 participant Logic as App Logic  
 participant Local as Local Storage  
 participant Auth as Firebase Auth  
 participant DB as Firestore  
 participant Storage as Cloud Storage  
 participant Functions as Cloud Functions  
 participant External as External APIs  
  
 %% Authentication Flow  
 rect rgb(200, 230, 255)  
 Note over User, External: Authentication Flow  
 User->>UI: Open App  
 UI->>Logic: Check Auth Status  
 Logic->>Local: Get Auth Token  
   
 alt New User  
 Logic->>UI: Show Login/Register Screen  
 User->>UI: Enter Credentials  
 UI->>Logic: Submit Credentials  
 Logic->>Auth: Authenticate User  
 Auth-->>Logic: Auth Response  
 Logic->>Local: Store Auth Token  
 else Returning User  
 Local-->>Logic: Return Valid Token  
 Logic->>Auth: Validate Token  
 Auth-->>Logic: Validation Response  
 end  
   
 Logic->>UI: Update Auth State  
 UI->>User: Show Dashboard  
 end  
  
 %% Mood Entry Flow  
 rect rgb(220, 255, 220)  
 Note over User, External: Mood Entry Flow  
 User->>UI: Tap "Add Mood Entry"  
 UI->>User: Display Mood Entry Form  
 User->>UI: Select Mood & Factors  
   
 opt Add Context  
 User->>UI: Tap "Add Context"  
 UI->>External: Request Location  
 External-->>UI: Return Location  
 UI->>External: Request Weather  
 External-->>UI: Return Weather Data  
 UI->>User: Display Context Options  
 User->>UI: Confirm Context  
 end  
   
 User->>UI: Add Notes/Media  
 opt Add Photo  
 User->>UI: Capture Photo  
 UI->>Logic: Process Photo  
 Logic->>Local: Store Locally  
 end  
   
 User->>UI: Submit Entry  
 UI->>Logic: Process Entry  
 Logic->>Local: Save Entry Locally  
   
 alt Online  
 Logic->>DB: Sync Entry  
 DB-->>Logic: Sync Confirmation  
   
 opt Has Media  
 Logic->>Storage: Upload Media  
 Storage-->>Logic: Upload Confirmation  
 Logic->>DB: Update Entry with Media URLs  
 end  
   
 Logic->>Functions: Trigger Analysis  
 Functions->>DB: Update Insights  
 Functions-->>Logic: Analysis Complete  
 end  
   
 Logic->>UI: Confirm Submission  
 UI->>User: Show Success Message  
 end  
   
 %% Data Visualization Flow  
 rect rgb(255, 230, 230)  
 Note over User, External: Data Visualization Flow  
 User->>UI: Open Insights Section  
 UI->>Logic: Request Insights Data  
 Logic->>Local: Get Local Data  
   
 alt Online  
 Logic->>DB: Request Latest Insights  
 DB-->>Logic: Return Insights Data  
 Logic->>Local: Update Local Cache  
 end  
   
 Local-->>Logic: Return Mood Data  
 Logic->>Logic: Process Data for Visualization  
 Logic->>UI: Provide Formatted Data  
 UI->>User: Display Charts & Patterns  
   
 User->>UI: Interact with Visualization  
 UI->>Logic: Process Interaction  
 Logic->>UI: Update Visualization  
 UI->>User: Show Updated View  
 end  
   
 %% Data Sync Flow  
 rect rgb(255, 255, 220)  
 Note over User, External: Data Synchronization Flow  
 User->>UI: App Returns to Foreground  
 UI->>Logic: Check for Pending Sync  
 Logic->>Local: Get Unsynchronized Data  
   
 alt Has Pending Data  
 Local-->>Logic: Return Pending Data  
 Logic->>Logic: Check Network Status  
   
 alt Online  
 Logic->>DB: Sync Pending Entries  
 DB-->>Logic: Sync Confirmation  
   
 opt Has Pending Media  
 Logic->>Storage: Upload Pending Media  
 Storage-->>Logic: Upload Confirmation  
 Logic->>DB: Update Entries with Media URLs  
 end  
   
 Logic->>DB: Get Remote Changes  
 DB-->>Logic: Return Remote Changes  
 Logic->>Local: Merge Remote Changes  
 Logic->>UI: Update UI with New Data  
 end  
 end  
   
 Logic->>UI: Sync Status Update  
 UI->>User: Indicate Sync Status  
 end  
   
 %% Settings & Preferences Flow  
 rect rgb(230, 230, 255)  
 Note over User, External: Settings & Preferences Flow  
 User->>UI: Open Settings  
 UI->>Logic: Get Current Settings  
 Logic->>Local: Retrieve Settings  
 Local-->>Logic: Return Settings  
 Logic->>UI: Display Settings  
   
 User->>UI: Modify Settings  
 UI->>Logic: Save Settings  
 Logic->>Local: Update Local Settings  
   
 alt Online  
 Logic->>DB: Sync Settings  
 DB-->>Logic: Confirm Settings Update  
 end  
   
 Logic->>UI: Confirm Settings Saved  
 UI->>User: Show Settings Updated  
 end

## Figure 4.17: Sequence Diagram - Key User Interaction Flows in Pro Mood Tracker

This sequence diagram illustrates the primary user interaction flows in the Pro Mood Tracker application, showing how data and control flow between different system components during key user actions.

### Main Interaction Flows:

#### 1. Authentication Flow

* Handles user authentication for both new and returning users
* Securely manages authentication tokens
* Provides appropriate UI states based on authentication status

#### 2. Mood Entry Flow

* Captures user mood data through an intuitive form interface
* Enriches entries with contextual data (location, weather)
* Supports media attachments
* Implements dual-storage strategy (local first, then cloud)
* Triggers analysis for insights generation

#### 3. Data Visualization Flow

* Retrieves mood data from local and cloud sources
* Processes data into meaningful visualizations
* Supports interactive exploration of mood patterns
* Adapts to online/offline status

#### 4. Data Synchronization Flow

* Automatically detects and syncs pending data when connectivity is available
* Handles media uploads separately from text data
* Merges remote changes with local data
* Provides users with sync status feedback

#### 5. Settings & Preferences Flow

* Allows users to customize their experience
* Stores settings locally for immediate access
* Synchronizes settings to the cloud for cross-device consistency

### Key Design Patterns Demonstrated:

1. **Offline-First Architecture**: All user actions are first processed and stored locally before being synchronized to the cloud.
2. **Optimistic Updates**: The UI immediately reflects user changes while synchronization happens in the background.
3. **Progressive Enhancement**: Core functionality works offline, with additional features available when online.
4. **Context Enrichment**: Mood entries are automatically enhanced with relevant contextual information when available.
5. **Asynchronous Processing**: Heavy operations like media uploads and data analysis happen asynchronously without blocking the UI.
6. **State Management**: The application maintains clear state transitions throughout user interactions.

This sequence diagram highlights the Pro Mood Tracker’s focus on providing a seamless user experience while efficiently managing data flow between local storage and cloud services. The architecture prioritizes responsiveness and reliability, ensuring users can record their moods under any network condition.