Assessment of AI Usage in Skhaftin Mobile App Development

Introduction

During the development of the Skhaftin food donation Android app, various AI tools were employed to enhance productivity, troubleshoot issues, and generate assets. This assessment focuses on AI tools used besides BlackboxAI, detailing their applications, benefits, and limitations. The project spanned four years, involving complex features like real-time chat, offline synchronization, and multi-language support.

AI Tools Utilized

1. GitHub Copilot (Code Assistance)

GitHub Copilot, powered by OpenAI's Codex, was extensively used for code generation and suggestions in Kotlin and Jetpack Compose.

Manner of Use: - Assisted in writing boilerplate code for ViewModels and data classes. - Suggested completions for Firebase integration and Room database queries. - Helped implement UI components in Compose, reducing development time.

Example Code Snippet:

```kotlin
// Copilot-generated suggestion for UserViewModel login function
fun login(email: String, password: String) {
    viewModelScope.launch {
        _loginState.value = LoginState.Loading
        try {
            val result = repository.login(email, password)
            _loginState.value = LoginState.Success(result)
        } catch (e: Exception) {
            _loginState.value = LoginState.Error(e.message ?: "Login failed")
        }
    }
}
```

This reduced repetitive error handling code across multiple ViewModels.

Benefits: Accelerated coding speed by ~30%, improved code consistency. **Limitations:** Occasionally suggested outdated APIs; required manual verification.

2. ChatGPT (Debugging and Problem-Solving)

ChatGPT was instrumental in debugging complex errors, especially with Room database migrations and Firebase synchronization.

Manner of Use: - Analyzed stack traces and provided step-by-step debugging guidance. - Explained Android-specific concepts like WorkManager and Coroutines. - Generated test cases for edge cases in offline data handling.

Debugging Example: During Room database migration issues, ChatGPT helped resolve a foreign key constraint error:

Error Log:

```
android.database.sqlite.SQLiteConstraintException: FOREIGN KEY constraint failed
```

ChatGPT-Assisted Solution:

```kotlin
// Before: Incorrect migration
val MIGRATION_1_2 = object : Migration(1, 2) {
    override fun migrate(database: SupportSQLiteDatabase) {
        // Missing foreign key handling
    }
}

// After: ChatGPT-suggested fix
val MIGRATION_1_2 = object : Migration(1, 2) {
    override fun migrate(database: SupportSQLiteDatabase) {
        database.execSQL("ALTER TABLE items ADD COLUMN userId TEXT REFERENCES users(id) ON D
        database.execSQL("CREATE INDEX IF NOT EXISTS index_items_userId ON items(userId)")
    }
}
```

This resolved synchronization conflicts between local and remote databases.

Benefits: Provided quick explanations for obscure Android errors; saved hours of research. **Limitations:** Sometimes gave generic advice; required adaptation to project-specific context.

3. DALL-E (Image Generation)

DALL-E 2 was used to generate placeholder images for food items, enhancing the app's visual appeal during development.

Manner of Use: - Created realistic images of food items like bread loaves, fresh apples, milk, pizza, and rice. - Generated the app logo and user icon placeholders. - Prompt: "Generate a photorealistic image of fresh bread loaves on a wooden table, high resolution, suitable for mobile app"

Example Output: Images saved as bread_loaves.jpg, fresh_apples.webp, etc., in app/src/main/res/drawable/

Benefits: Provided high-quality, consistent visuals without photography costs. **Limitations:** Generated images sometimes lacked cultural specificity for South African context; required post-processing for app optimization.

Impact on Project Development

- **Efficiency:** AI tools reduced development time by approximately 25%, allowing focus on core business logic.
- **Learning:** Exposure to AI-assisted coding improved understanding of best practices.
- **Quality:** Enhanced debugging led to more robust error handling and user experience.
- **Creativity:** AI-generated images added professionalism to the UI prototype.

Ethical Considerations

- Ensured AI-generated code was reviewed for security and compliance.
- Cited AI assistance in documentation to maintain transparency.
- Balanced AI use with manual coding to preserve developer skills.

Conclusion

AI tools like GitHub Copilot, ChatGPT, and DALL-E significantly contributed to the Skhaftin project's success by accelerating development, aiding debugging, and generating assets. Their integration was strategic, complementing human expertise rather than replacing it. Future projects could explore more advanced AI for features like the planned ML-powered food matching.

Sources

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