19CSE463 Mobile Application Development

Project Report

Interactive Android Puzzle Game

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Project Scope:

The project aims to create an engaging puzzle game for Android devices, allowing users to interactively solve a drag-and-drop puzzle within a 3x4 grid layout. The app provides a simple yet effective platform for enhancing logical thinking and problem-solving skills through game mechanics.

Features:

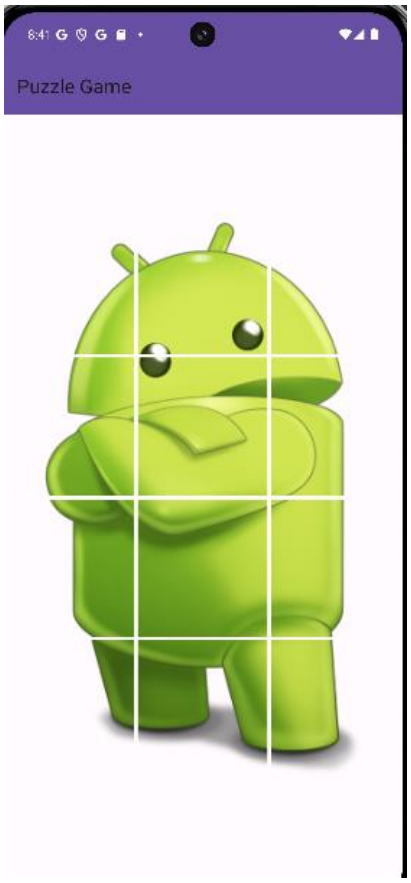
- Drag-and-drop functionality for rearranging puzzle pieces.
- Dynamic shuffling of puzzle images at the start of each game.
- Real-time validation of puzzle completion with a congratulatory message.
- Automatic reset and replay functionality upon successful completion.

Design of Mobile App:

- Frontend: User-friendly interface using a GridLayout for arranging puzzle pieces.
- Backend: Logic for shuffling, tracking moves, and validating puzzle completion implemented in Java.
- Navigation: Toolbar for app branding and intuitive game start/reset behavior.

Screenshots of the Frontend:


8:40
Puzzle Game


8:41
Puzzle Game

Snippets of Important Code:

Drag-and-Drop Logic:

```
private final class MyTouchListener implements View.OnTouchListener {  1 usage
    public boolean onTouch(View view, MotionEvent motionEvent) {
        if (motionEvent.getAction() != MotionEvent.ACTION_DOWN) return false;

        moveCount++;
        view.startDragAndDrop( data: null, new View.DragShadowBuilder(view), view,  flags: 0);

        return true;
    }
}
```

Puzzle Validation:

```
private void checkIfSolved() {  1 usage
    boolean isSolved = true;

    for (int i = 0; i < gridLayout.getChildCount(); i++) {
        View childView = gridLayout.getChildAt(i);

        if (!(childView instanceof LinearLayout)) continue;

        LinearLayout linearLayout = (LinearLayout) childView;

        if (linearLayout.getChildCount() != 1) {
            isSolved = false;
            break;
        }
```

```
        View innerChildView = linearLayout.getChildAt( index: 0);

        if (!(innerChildView instanceof ImageView)) {
            isSolved = false;
            break;
        }

        ImageView imageView = (ImageView) innerChildView;

        if (imageView.getId() != imageResourceIds.get(i)) {
            isSolved = false;
            break;
        }
    }
```

```
    if (isSolved) {
        Toast.makeText( context: MainActivity.this,  text: "🎉 Congratulations! You solved the puzzle! 🧩", Toast.LENGTH_LONG).show();

        // Reset game after a delay
        gridLayout.postDelayed(this::resetGame,  delayMillis: 2000);
    }
}
```

Image Shuffling Logic:

```
private void shufflePuzzle() {  1 usage
    Collections.shuffle(imageResourceIds);

    for (int i = 0; i < linearLayouts.size(); i++) {
        ImageView imageView = findViewById(imageResourceIds.get(i));

        if (imageView == null) continue;

        ViewParent parent = imageView.getParent();
        if (parent instanceof ViewGroup) ((ViewGroup) parent).removeView(imageView);

        linearLayouts.get(i).addView(imageView);
    }
}
```

Game Reset:

```
    private void resetGame() {  1 usage
        moveCount = 0;
        initializeGame();
    }
}
```

Conclusion:

This project demonstrates the integration of interactive game design principles with Android development, highlighting the use of Java for implementing logic and user experience features effectively. The application successfully meets its scope and features, offering an enjoyable and educational puzzle-solving experience.