

Teamproject

Implementation of an AI Sandbox for the E-Learning Platform of the Software Engineering Chair



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SWT E-Learning Platform

The platform provides various options for practicing content from lectures and preparing for exams

- **Exercises** (Multiple Choice / Cloze / Order / DragNDrop / Coding ...)
- **Exercise Sheets, Mock Exams**
- **Playgrounds**

Playgrounds

- Playgrounds enable easy access to complex topics by "playing around" with
 - different settings
 - different parameters

Playground Example: Using Affine Transformations in Java

Java code change when you change the parameters. You can check the output of the Java code by copying it to a .java file and run it directly.

RESET ALL

1 Translate

RESET translation.x:

RESET translation.y:

2 Rotate

RESET rotation_center.x:

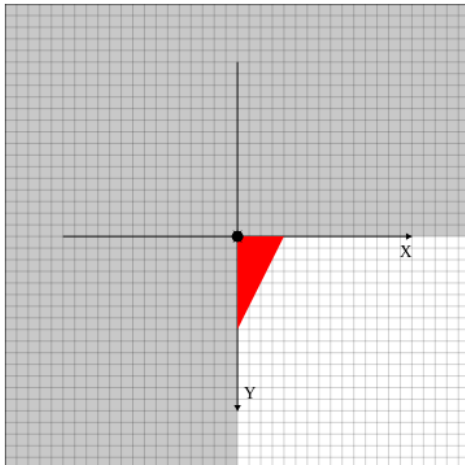
RESET rotation_center.y:

RESET rotation_angle:

3 Scale

RESET scale.x:

RESET scale.y:



Note:
The resolution of the grid-lines is 10.

Corresponding java code:

```
@Override
protected void paintComponent(Graphics g) {
    super.paintComponent(g);
    Graphics2D g2d = (Graphics2D) g.create();
    // Move the origin to the center of the panel for convenience
    g2d.translate(getWidth() / 2.0, getHeight() / 2.0);
    // Apply transformations
    AffineTransform transform = new AffineTransform();
    transform.scale(scaleX, scaleY);
    transform.rotate(Math.toRadians(rotation), rotationCenterX, rotationCenterY);
    transform.translate(translationX, translationY);
    g2d.setTransform(transform);
    // Draw the triangle
    g2d.setColor(Color.RED);
    g2d.fillPolygon(xPoints, yPoints, xPoints.length);
    // Dispose of the graphics context
    g2d.dispose();
}

public static void main(String[] args) {
    SwingUtilities.invokeLater(() -> {
        JFrame frame = new JFrame("Interactive GUI Triangle");
        TriangleComponent triangleComponent = new TriangleComponent();
        // Setup the frame
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.getContentPane().add(triangleComponent);
        frame.pack();
        frame.setLocationRelativeTo(null);
        frame.setVisible(true);
        // Translate, rotate, and scale the triangle
        triangleComponent.setTranslationX(0);
        triangleComponent.setTranslationY(0);
        triangleComponent.setRotation(0);
        triangleComponent.setRotationCenter(0, 0);
        triangleComponent.setScale(1, 1);
    });
}
```

Project Goal

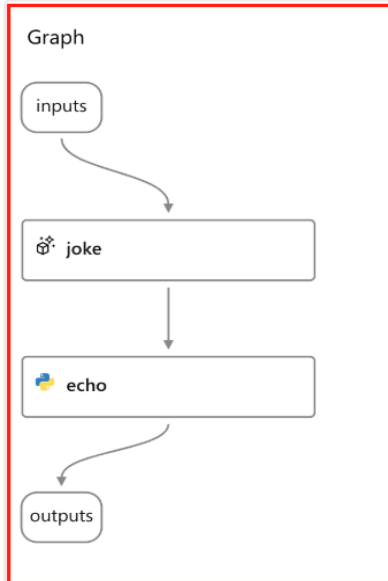
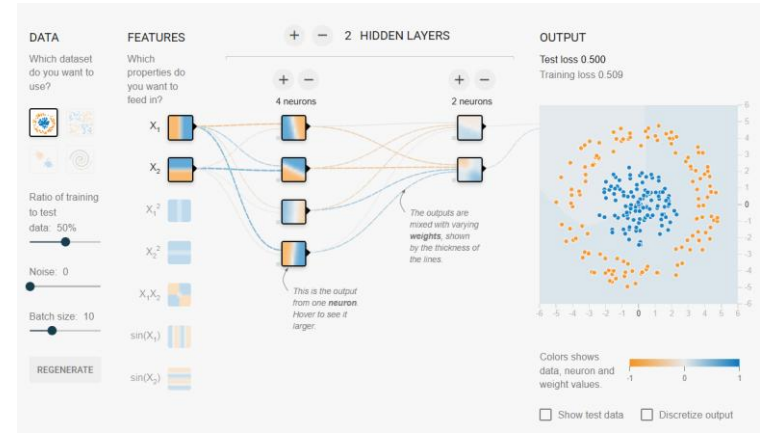
- You will enhance this E-Learning platform with an interactive *AI Playground*.
- The *AI Playground* is an interactive environment designed to help students understand key Machine Learning concepts.

Key Topics:

- **Fundamentals of ML** (Neural networks, algorithms)
- **Natural Language Processing (NLP)**
- **Large Language Models (LLMs)**
- **Computer Vision**

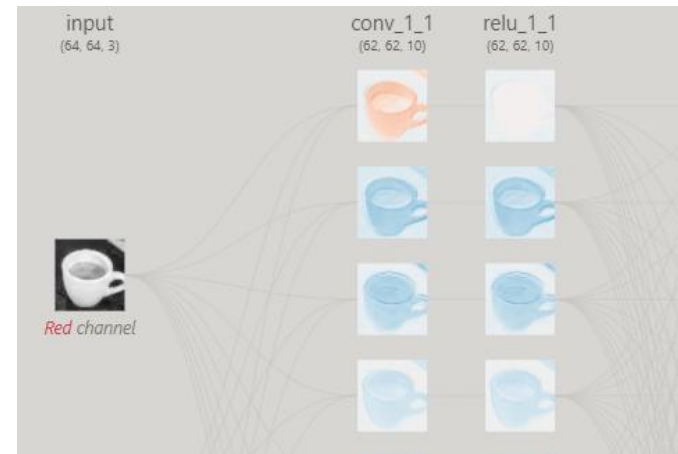
Example Implementations

Neural Network:
Tensorflow
Playground



LLM:
Azure prompt
Flow

**Computer
Vision:**
CNN explainer



Benefits and Requirements from Students

Language: German/English

Duration: 6 months

Participants: 5–8 students

What should you bring?

Basic knowledge in Web-Development, preferably in Typescript, Prisma and tRPC

What's in it for you?

- **Hands-on experience** in web development (TypeScript, Prisma, tRPC)
- **Deeper understanding of ML** through real-world application
- **Work on a real software project** with impact
- **Flexibility:** Fully online participation possible

Questions?

Sources

- TensorFlow, *Neural Network Playground*, <https://playground.tensorflow.org/> [accessed 30 January 2025].
- Microsoft, *Prompt Flow - Azure AI Studio*, <https://learn.microsoft.com/en-us/azure/ai-studio/how-to/prompt-flow> [accessed 30 January 2025].
- Polo Club, *CNN Explainer: An Interactive Visualization of Convolutional Neural Networks (CNNs)*, <https://poloclub.github.io/cnn-explainer/> [accessed 30 January 2025]