

PORTFOLIO

Bridging tradition with digital flow,
Crafting tools where knowledge grows,
Preserving culture through tech's glow.

Name: Lingxiao Xu

Self-introduction

Name: Lingxiao Xu

Age: 21

Location: Nanjing, Jiangsu Province, China

University: Communication University of China

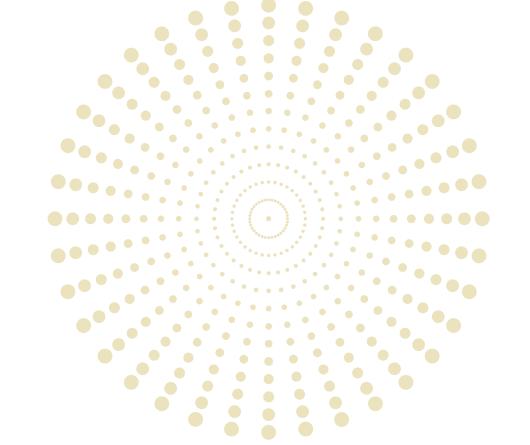
Skills:

- Design & Video Editing: Adobe Photoshop, Procreate, Adobe Premiere Pro, Microsoft Office.
- Programming & Development: Python, Java, C++, C#, JavaScript; frameworks like TensorFlow, PyTorch.
- Data Analysis & Modeling: R, Matlab, Lingo; expertise in Numpy, Pandas, Scikit-learn.
- Version Control: Git.



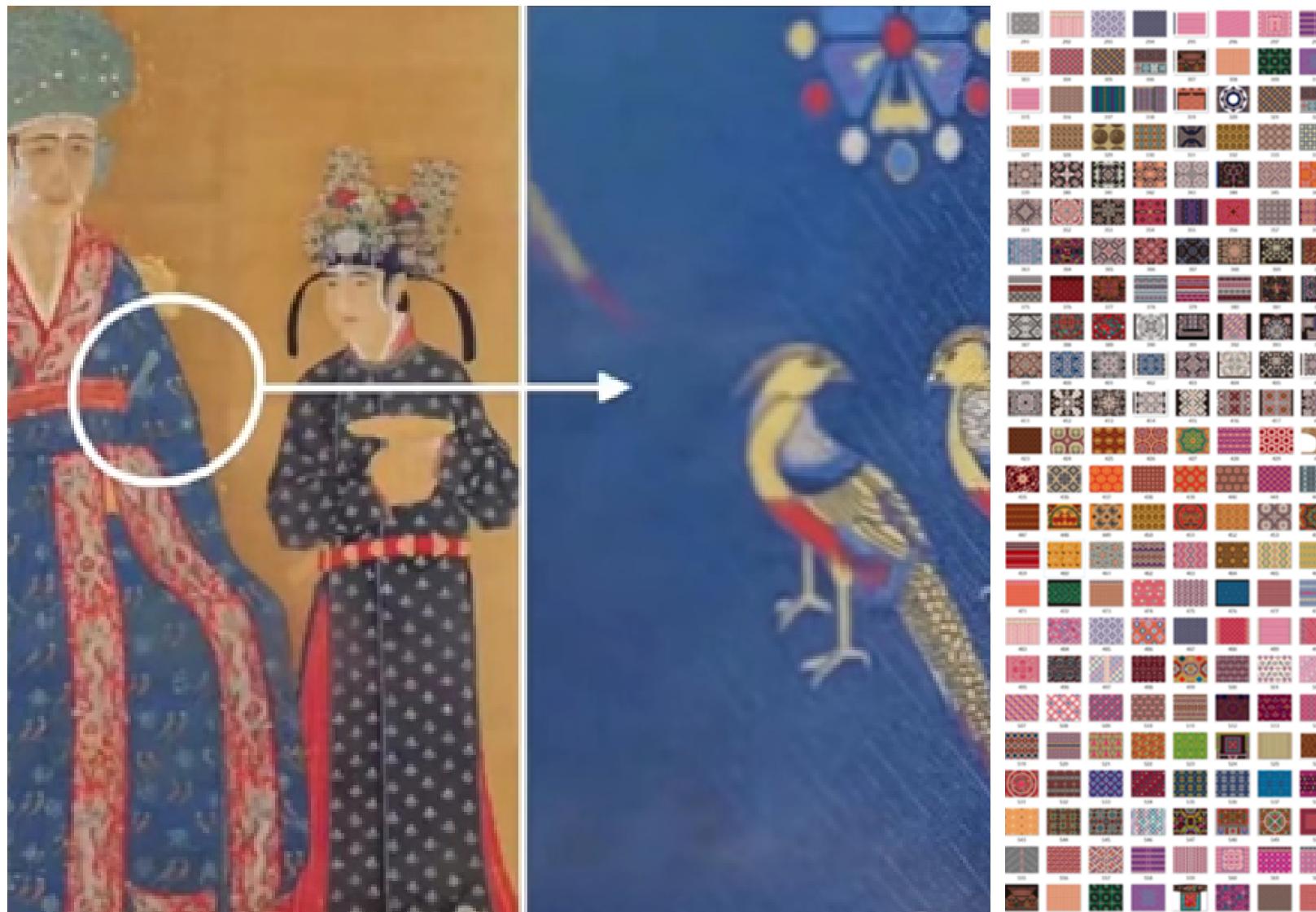
PART.01

Digital Brocade



Introduction of works

Innovating tradition and preserving cultural heritage



The weaving techniques of the Four Famous Brocades embody the artisans' love for life and dedication to cultural heritage. This project merges humanistic insight with digital innovation by creating a knowledge graph that vividly showcases the cultural richness of the brocades, reviving the artistry and stories lost to time. Going further, deep learning techniques recreate the intricate patterns and textures of brocades, granting traditional crafts a modern form of expression. For artifacts worn by history, this project expects to employ digital restoration to restore their brilliance, enabling them to tell their stories anew in a contemporary light.

Project background

My role: researcher

Skills used: knowledge graph, deep learning algorithms (CNN, VGG), data collection and analysis, web development (Vue.js, Neo4j), image processing and simulation

Project type: research and innovation project for the cultural heritage of Chinese Four Famous Brocades

Project length: 1 year

Team size: 5 members



Video presentation



An overview of Digital Brocade.MP4

Shared with Dropbox

Dropbox

<https://www.dropbox.com/scl/fi/wd8vdurshw7pt96rp9lec/An-overview-of-Digital-Brocade.MP4?rlkey=3ypyici935q6jalj1jv44ln2vr&st=i9tym0ak&dl=0>



Brocade style pattern generation display.MP4

Shared with Dropbox

Dropbox

<https://www.dropbox.com/scl/fi/s2s9usnuo6qeennztabwmw/Brocade-style-pattern-generation-display.MP4?rlkey=3y5kz2z58pgj6ajsd6qviu8qr&st=ryetndj2&dl=0>

Thematic knowledge graph and semantic search

Knowledge graph

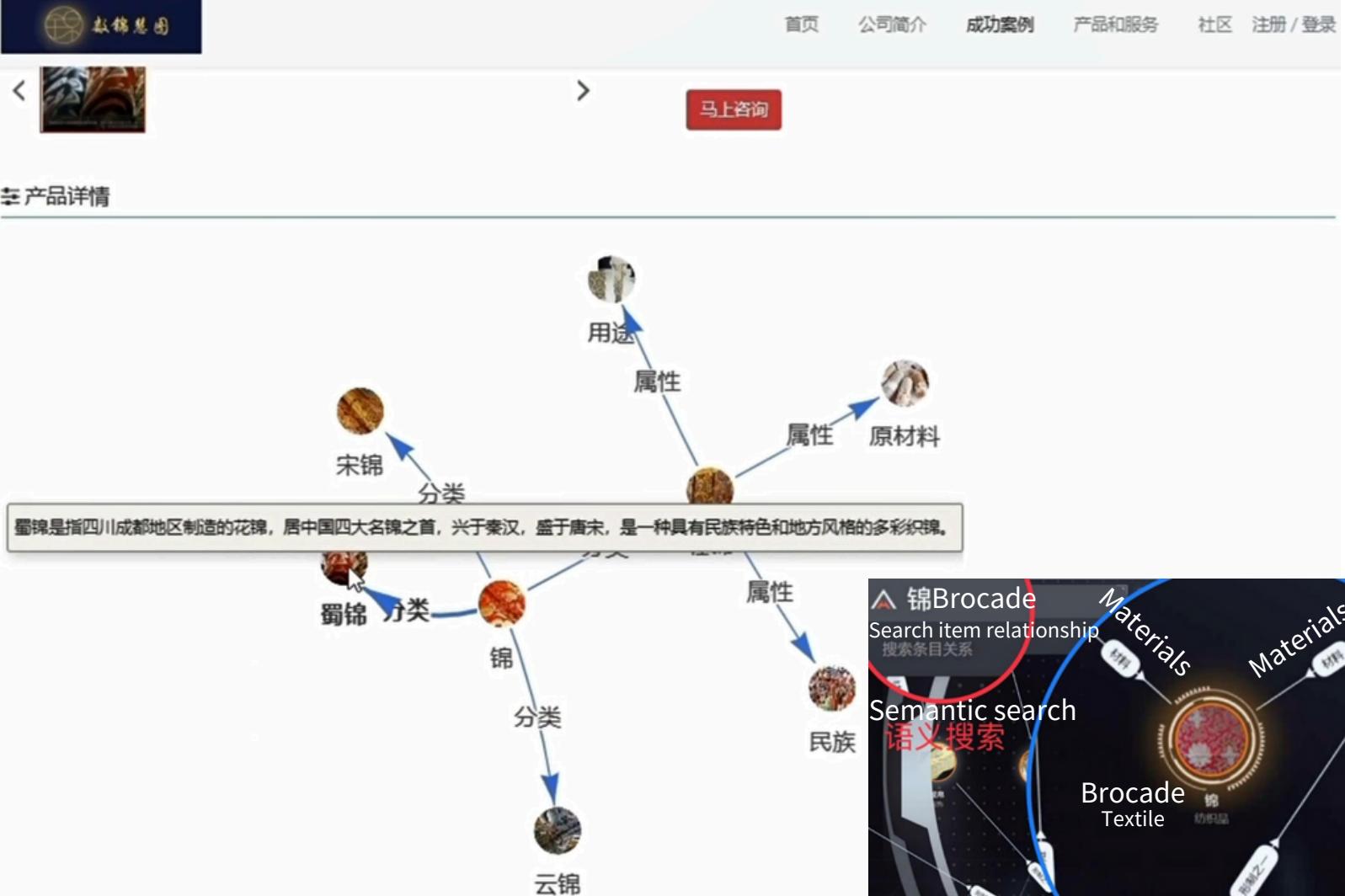
The four famous brocades are systematically and structurally sorted out, and the knowledge of the four famous brocades is visually presented and discovered.

The images below and on the right are examples of the constructed knowledge graph, where each node stores information and the whole is dragable:



Use

Song brocade, one of the traditional Chinese silk crafts. Because it is mainly produced in Suzhou, it is also called "Suzhou Song brocade", Song brocade originated in Eastern Wu Dynasty, formed in Weiyun, flourishing in the Ming and Qing dynasties



Semantic search

The semantic retrieval module consists of two parts: retrieval frame and graph retrieval result. In terms of semantic search, this system not only satisfies the basic knowledge presentation of the searched term, but also can obtain detailed knowledge interpretation and knowledge presentation related to the searched term for the user.

Thematic knowledge graph and semantic search

Screenshot of part of code for building knowledge graph

```
43 // 创建一个网络图实例
44 var container = document.getElementById("graph");
45 var data = { nodes: nodes, edges: edges };
46 var options = {
47   nodes: {
48     shape: "image",
49     size: 15
50   }
51 };
52 var network = new vis.Network(container, data, options);
53
54 // 监听节点点击事件
55 network.on("click", function (event) {
56   var { nodes } = event;
57   if (nodes.length > 0) {
58     var nodeId = nodes[0];
59     var node = nodes.get(nodeId);
60     showNodeDetails(node);
61   }
62 });
63
64 // 显示节点详情
65 function showNodeDetails(node) {
66   var detailsContainer = document.getElementById("details");
67   detailsContainer.innerHTML = "<h3>" + node.label + "</h3>" + "<p>" + node.title + "</p>";
68 }
69 </script>
70 </body>
71 </html>
```

```
3 <head>
4   <title>Neo4j Knowledge Graph</title>
5   <meta charset="UTF-8">
6   <style type="text/css">
7     #graph {
8       width: 800px;
9       height: 600px;
10    }
11   </style>
12   <script src="https://unpkg.com/vis-network/standalone/umd/vis-network.min.js"></script>
13 </head>
14 <body>
15   <div id="graph"></div>
16   <div id="details"></div>
17
18 <script>
19   // 创建一个空的数据集对象
20   var nodes = new vis.DataSet();
21   var edges = new vis.DataSet();
22
23   // 添加节点和边到数据集
24   nodes.add([
25     { id: 1, label: "蜀锦", image: "img/11.png", title: "蜀锦是指四川成都地区制造的花锦，居中国四大名锦之首，兴于秦汉，盛于唐宋，是一种具有民族特色和地方风格的多彩织锦。" },
26     { id: 8, label: "云锦", image: "img/18.jpg", title: "云锦，即南京下锦，因其选材讲究，图案色彩瑰丽，宛若云霞一般，因此得名为“云锦”，又因其只有南京所生产，故又名为“南京云锦。” },
27     { id: 2, label: "锦", image: "img/12.jpg", title: "所有的锦。" },
28     { id: 3, label: "宋锦", image: "img/13.jpg", title: "宋锦，中国传统的丝制工艺品之一。因其主要产地在苏州，故又称“苏州宋锦”，宋锦源于东吴，形成于宋朝，繁盛于明清。" },
29     { id: 5, label: "民族", image: "img/14.jpg", title: "壮族。" },
30     { id: 6, label: "原材料", image: "img/15.jpg", title: "蚕丝和棉纱。" },
31     { id: 7, label: "用途", image: "img/16.jpg", title: "衣裙、巾被、背包、台布。" },
32   ]);
33
34   edges.add([
35     { from: 2, to: 1, label: "分类", arrows: "to" },
36     { from: 2, to: 8, label: "分类", arrows: "to" },
37     { from: 2, to: 4, label: "分类", arrows: "to" },
38     { from: 4, to: 5, label: "属性", arrows: "to" },
39     { from: 4, to: 6, label: "属性", arrows: "to" },
40     { from: 4, to: 7, label: "属性", arrows: "to" },
41     { from: 2, to: 3, label: "分类", arrows: "to" }
42   ]);
43 // 创建一个网络图实例
```

Digital exhibition

Web application system page

The web application system is divided into display page and management page, the two pages are shown in the two pictures on the left below.

In the web application system, it mainly realizes three functions: thematic knowledge base, constructing knowledge graph to realize semantic search, and building digital exhibition.

The image displays two screenshots of a web application system. On the left is the front-end display page, featuring a banner with traditional Chinese embroidery patterns and text about Song Brocade. It includes sections for 'Thematic knowledge base', 'Construct knowledge graph to realize semantic search', and 'Build digital exhibition'. On the right is the back-end management page, titled 'PbootCMS v3.2.3', showing a list of products and services with columns for ID, category, title, release time, sorting, status, top placement, recommendation, and visit count. The interface includes a sidebar with navigation links like '全局配置' (Global Configuration), '基础内容' (Basic Content), '文章内容' (Article Content), '专题内容' (Topic Content), '新闻内容' (News Content), and '产品内容' (Product Content). A large sidebar on the right contains sections for 'Products and services', 'Ability', 'Type', 'Color', and various knowledge graph-related features such as 'Topic Knowledge Base', 'Construct Knowledge Graph Semantic Search', and 'Build Digital Exhibition'.

Web application system home page

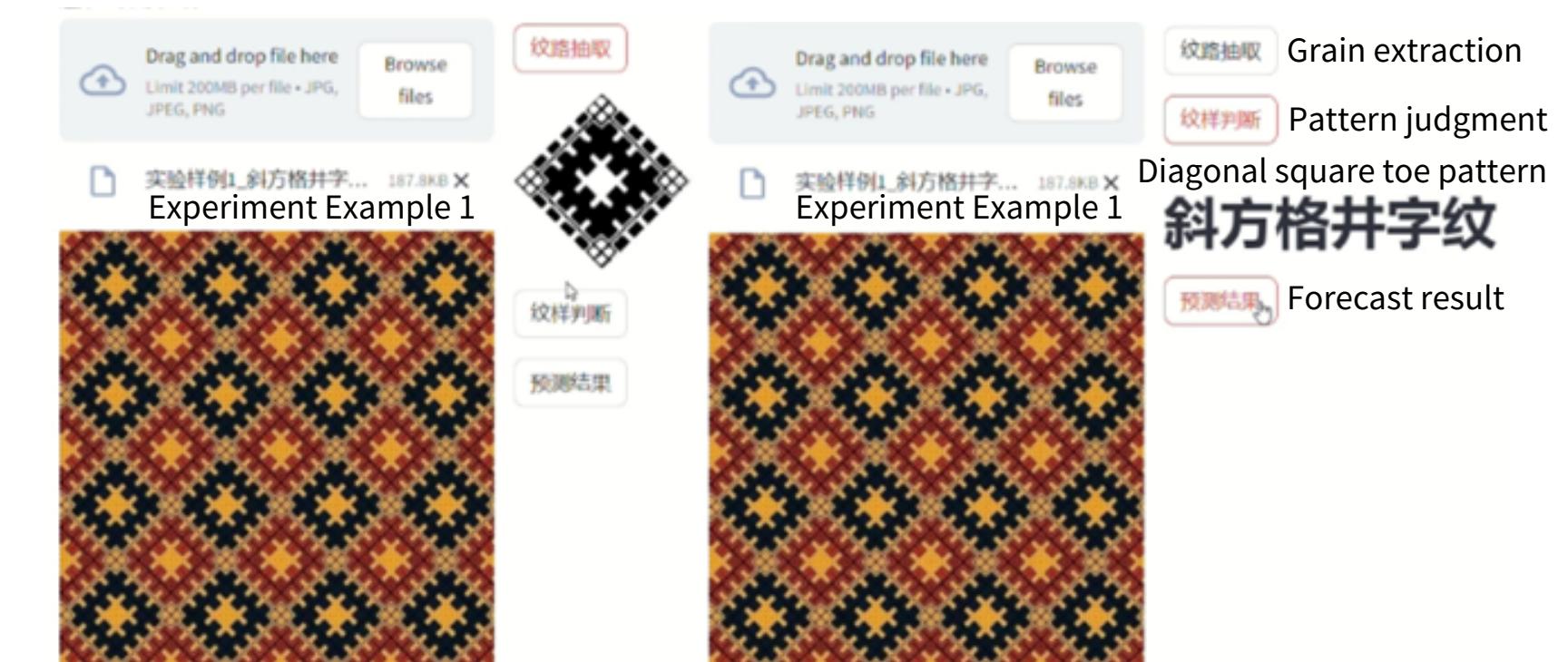
The navigation bar of the function module of this system is shown in the figure on the right. The user can switch the function module by selecting the corresponding module name.

Brocade style pattern generation

Recognition of beautiful pattern

To realize the recognition of beautiful pattern, pattern extraction and pattern judgment.

The image on the right is the recognition simulation diagram, the image upload and display function area on the left, and the image recognition result function area on the right.



"Digital tapestry" built on VGG (CNN-based)

The feature extraction of the target image is carried out through convolution calculation, and the front texture of the brocade is simulated, which provides more diversified visual expression and artistic creation for Nishikori technique.

The image on the right is the recognition simulation diagram, the image upload and display function area on the left, and the image recognition result function area on the right.

Pattern recognition cases

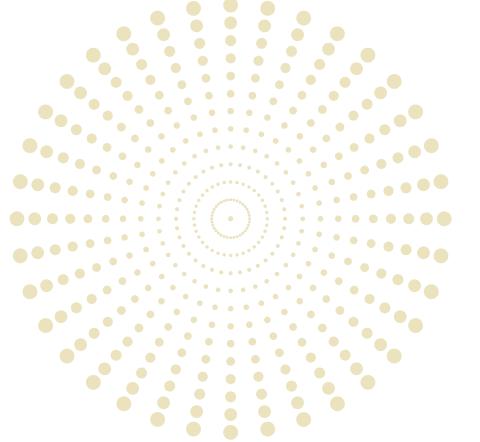
The image displays a 3x4 grid of pattern recognition interface examples. Each example consists of a file upload section, a preview image, and three buttons: '紋路抽取' (Pattern Extraction), '纹样判断' (Pattern Judgment), and '预测结果' (Prediction Result). The patterns shown include:

- Row 1: A green textured background with a small circular pattern, followed by a square pattern with a central dot.
- Row 2: A square pattern with a central dot, followed by a multi-colored hexagonal pattern with black ink blots, followed by a red and blue geometric pattern.
- Row 3: A multi-colored hexagonal pattern with black ink blots, followed by a square pattern with a central dot, followed by a red and blue geometric pattern.

It is effective for fuzzy, incomplete and multi-pattern image recognition!

PART.02

Original Poster Design



Original poster design

"ILLUMINATE"



"BREAK FREE"



This series of posters aims to showcase the emotional healing value that Pop Mart offers. When the harsh realities of life fail to fulfill our desires, we can turn our eyes to Pop Mart. It is the tangible manifestation of our dreams. Is dreaming off-limits for adults? The whole world may be pushing you towards maturity, yet Pop Mart creates dreams especially for you.

Pop Mart, a beloved brand, transcends being a mere toy seller. It's a gateway to a realm of thriving imagination and emotional comfort, its toys mirroring our deepest selves. Small in size and usually observed from above or at eye level, yet these toys possess great power. My posters magnify them with an upward gaze to spotlight their profound emotional value, themed "Illuminate" and "Break Free".

THANK YOU

Email: XuLingxiao9@outlook.com