Extension of the Tourist Guide with recognition of Bulgarian embroideries

Asya Stoyanova-Doycheva

Plovdiv University, Bulgaria

Tourist Guide

The main goal of the TG is to generate a tourist route for users in accordance with their interests and location. The life cycle of the TG includes the following basic steps:

- A tourist inquiry

- Selection of appropriate cultural and historical objects

- Generation of a tourist route implementation

Extension

- Training based on the sights seen by the user

- Pointing the camera to a folklore object

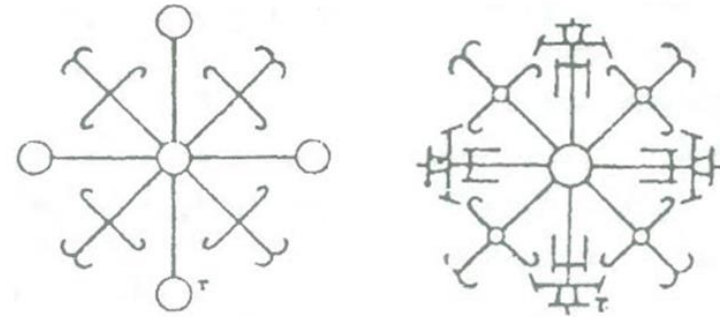- Real time recognition of the embroidery through a neural network
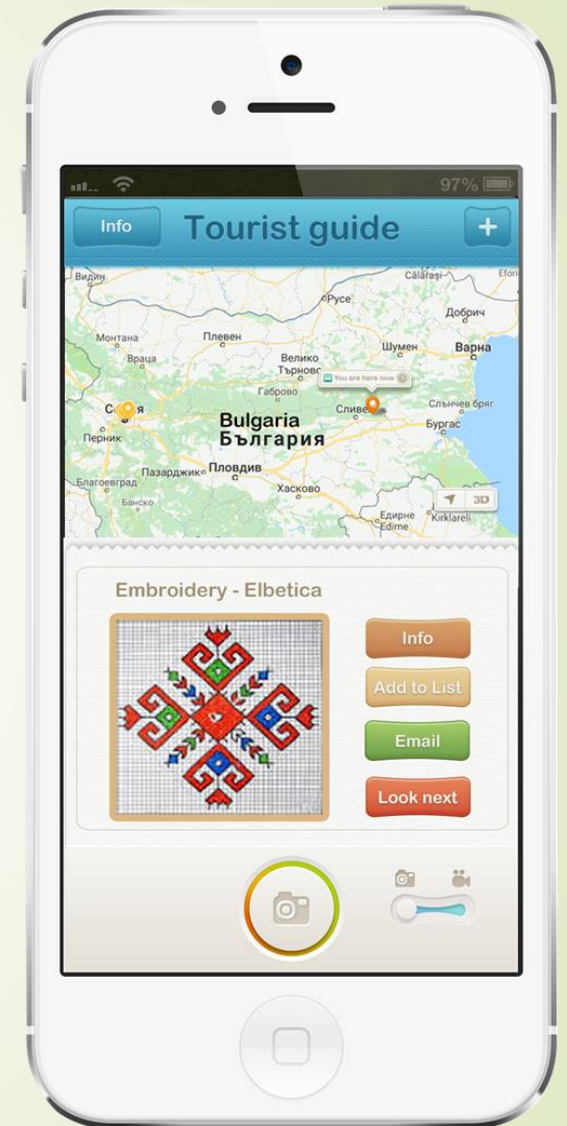
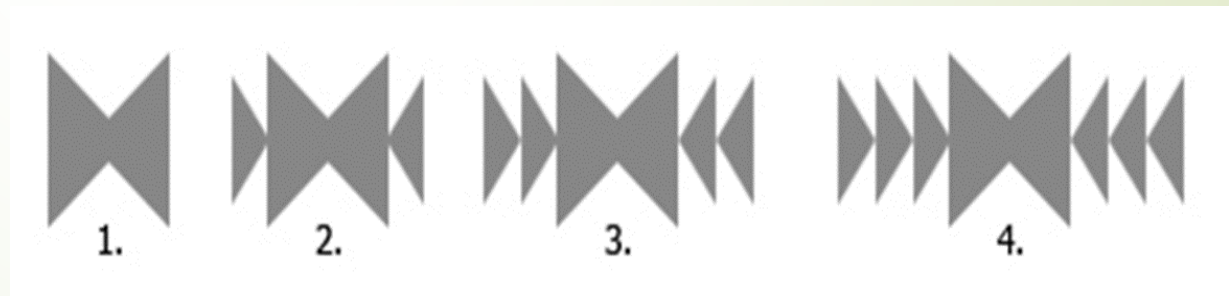# Specific Features of the Bulgarian Embroideries

■ **Functions**
- protective
- curative
- fertile
- identificational
- decorative

■ **Symbols**
- mother goddess
- tree of life
- elbetica
- kanatica
- swastika
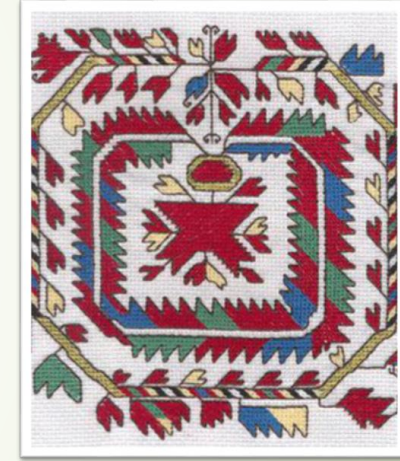- star, etc.

Kinds of elbetica

Kinds of kanatica: 1. wedding, 2. family, 3. kin, 4. nation

Specific Features of the Bulgarian Embroideries

➥ Motives

- geometric
- floral
- zoomorphic
- anthropomorphic

Mother Goddess

Specific Features of the Bulgarian Embroideries

- Colors
  - predominant - red
  - additional - blue and green
- Stitches
  - about 20 different ones
  - predominant - slanting and crossed
- Composition of ornaments
  - symmetrical or asymmetrical
  - straight or inclined
  - framed or not
  - arranged in a line, in squares or without an arrangement

Formal Presentation of the Embroidery

Embroidery – vector of ornaments O_i

$$E = [O_1, O_2, \ldots, O_q], q \geq 1$$

Ornament – vector of symbols S_i
$$O = [S_1, S_2, \ldots, S_r], r \geq 1$$

Symbol – vector with 4 parameters:
$$S = [k, m, b, c]$$

- value $k \in K$, K = {star, elbetica, ..., undetermined}
- motive $m \in M$, M = {geometrical, floral, zoomorphic, anthropomorphic}
- stitch $b \in B$, B = {slanting, crossed, ..., undetermined}
- color $c \in C$, C = {red, brown, black,... }

A Tourist Guide Task

1. Recognition of an image as an embroidery

   • recognition of two of the basic stitches – the slanting one and the crossed one

2. Definition of the embroidery as Bulgarian

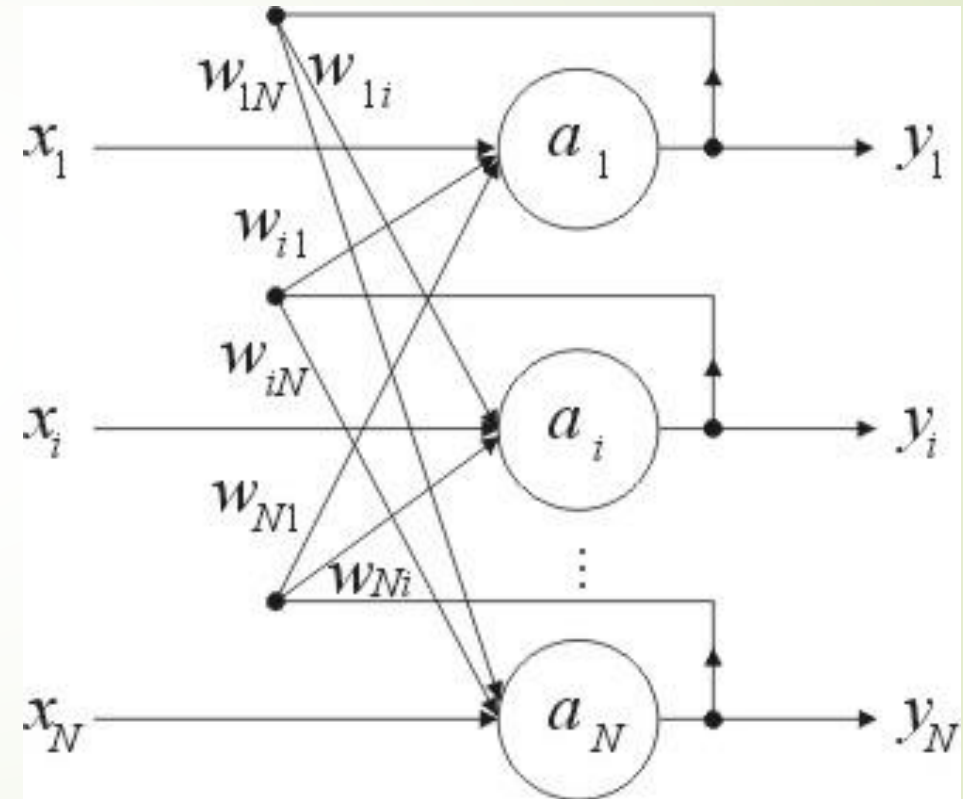3. Classification of the embroidery according to the area of workmanship
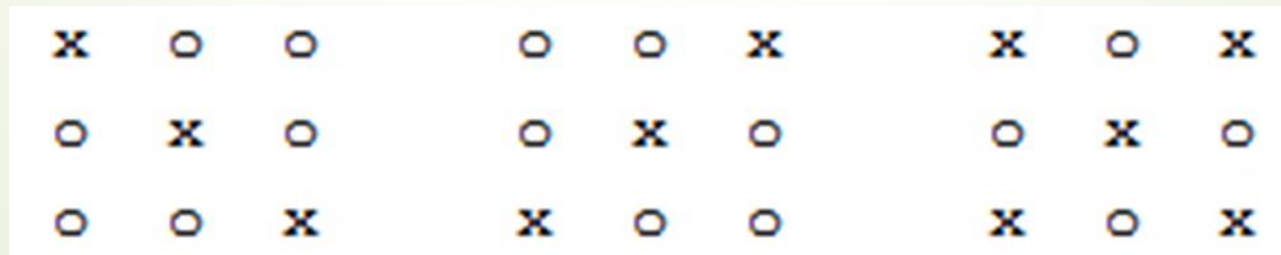
Left and right inclined stitches
and a crossed stitch

Realization (Java)

Hopfield Neural Network

- recurrent, fully-connected

- a single layer of neurons

- $w_{ij} = w_{ji}$

- $w_{ii} = 0$

- $w_{ij} = \begin{cases} \frac{1}{p}\sum_{k=1}^{p} x_{ik}x_{kj}, i \neq j \\ 0, \qquad\qquad i = j \end{cases}$

- $y_i = \mathrm{sgn}\left(x_i + \sum_{j=1}^{N} y_j w_{ij}\right)$

Realization (Java)

Conclusion

Iterations	Mutation	Accuracy
10000	0	1.0
10000	1	1.0
10000	2	1.0
10000	3	0.9465
10000	4	0.7727
10000	5	0.6225

Mutation = 1

Mutation = 2

Mutation = 9

Thank you for your attention!

Six Bulgarian ethnographic regions