

Perceptible Transition of Textures on Tactile Maps for Visually Impaired Users

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and

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Bachelor Thesis in Computer Science

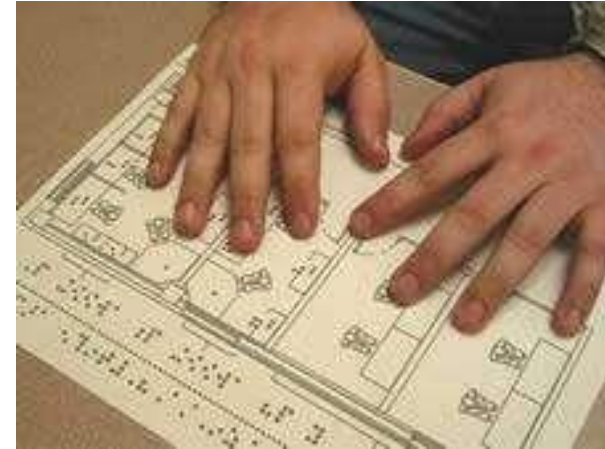
Oral Defense

Introduction :

- What are Tactile Graphics ?**
- The Particularity of Blue Noise Point Patterns**

→ Tactile Graphics

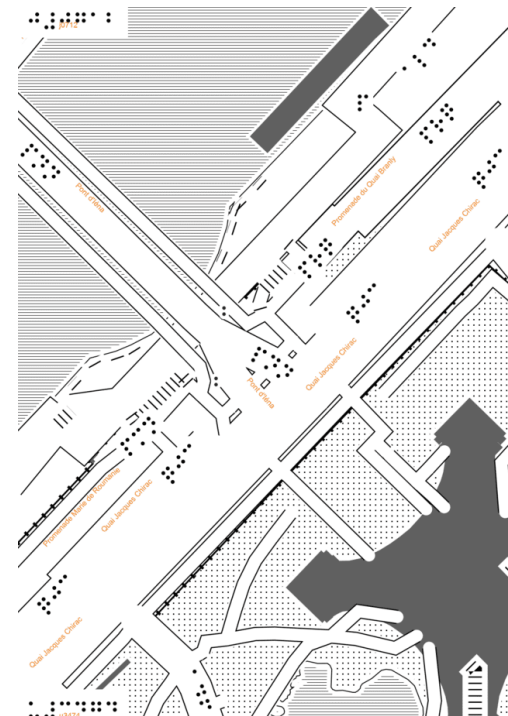
- Raised lines and surfaces
- Non-textual information
- Educational tools



→ Tactile Graphics



Multi-projection line drawing

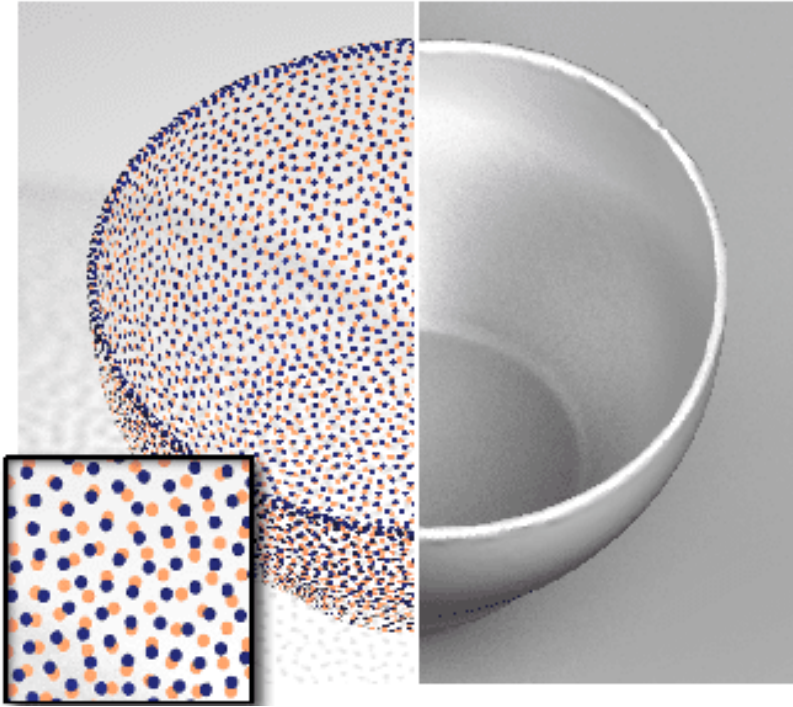


MAP LEGEND 1:1200

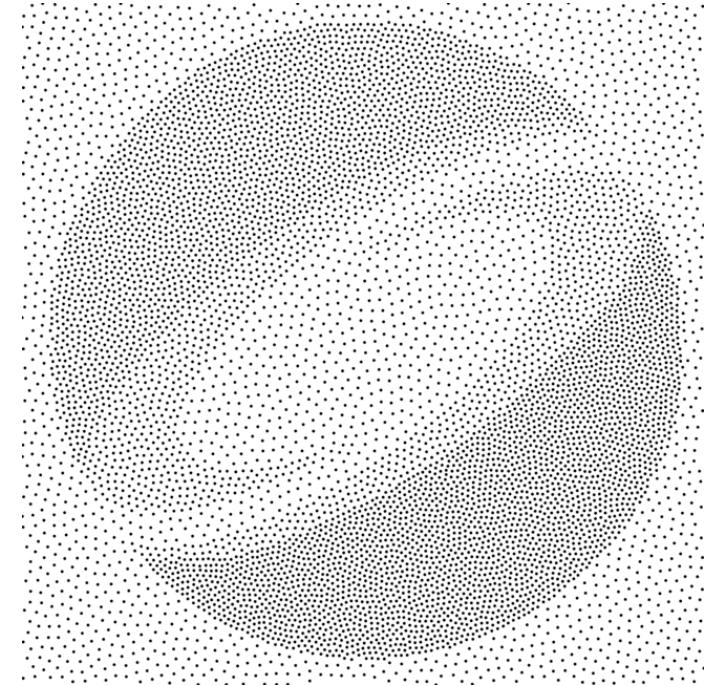
		BUILDINGS
		WATER AREA
		VEGETATION
		INDUSTRIAL AREAS
		STREET, PATH
		TRAM
		BUS STOP
		RAILWAY
		STAIRS
		WALL
		BROOK
		PARKING AREA

Tactile map generated by Mapy.cz

→ Blue Noise Point Patterns



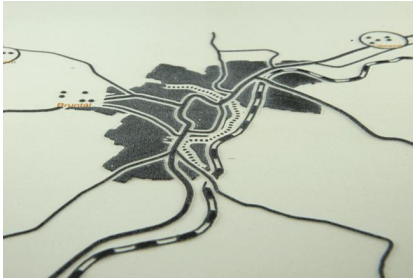
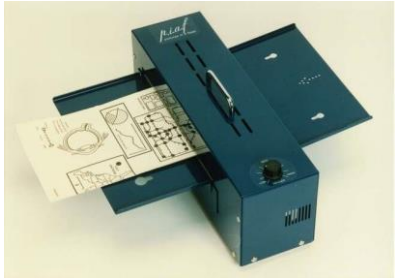
*Strategical point positioning
to reconstruct a surface*



Spatially-varying density

From Design to Fabrication of Tactile Maps

→ Different Fabrication Methods & Limitations

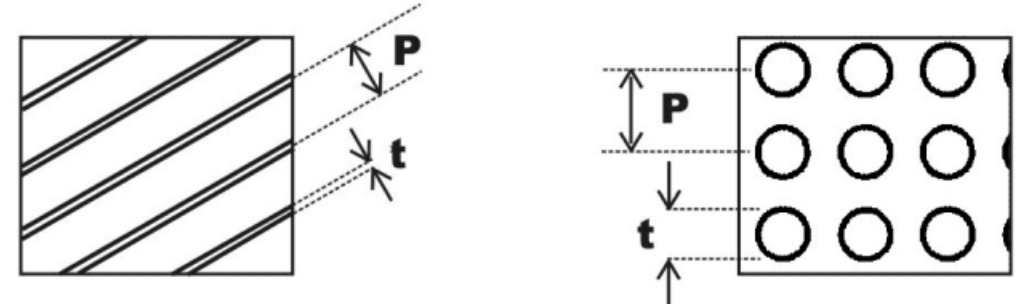
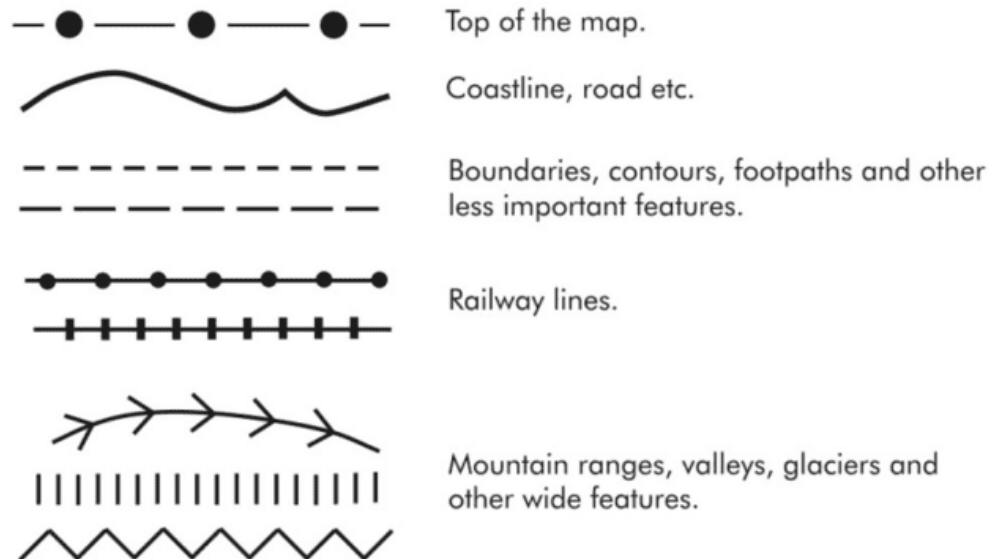


Fabrication Method	Benefits	Drawbacks
Hand-crafting	Rapid, accessible	No durability, no replicability
Braille embosser	Portable device	Limitation of details, expensive
Heat embossing	Replicability, details	Low durability, expensive
Thermoforming	Varying relief heights	Inconsistent quality, use of plastic
Resin printing	Robustness, details	Expensive, slow fabrication

→ Guidelines on Tactile Symbols : Point, Line, Texture

Choice of tactile symbols :

- Realism & simplicity
- Universal & custom symbols
- Area symbols : style, pitch, thickness



Map composition & numerical parameters :

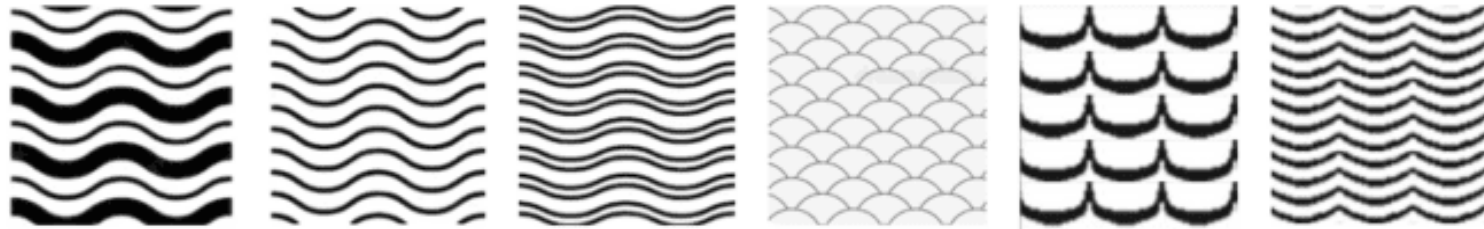
- Legends & labels
- Scaling & number of features
- Numerical parameters for symbols

Methodology

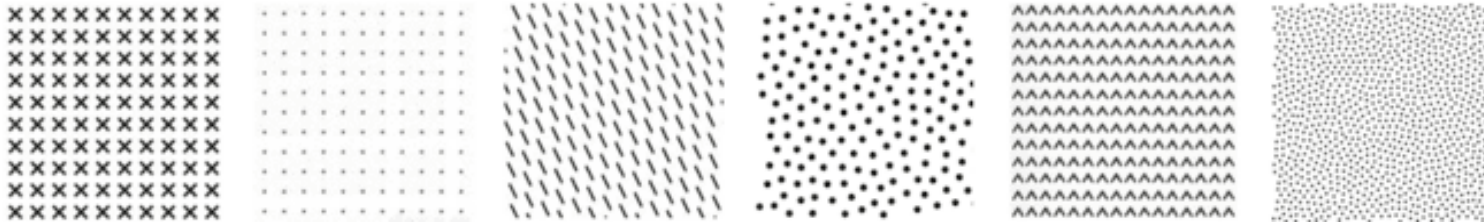
Q1 : Identifying the most representative patterns for environments

Q2 : Estimating the haptic perceptible distance between tactile patterns

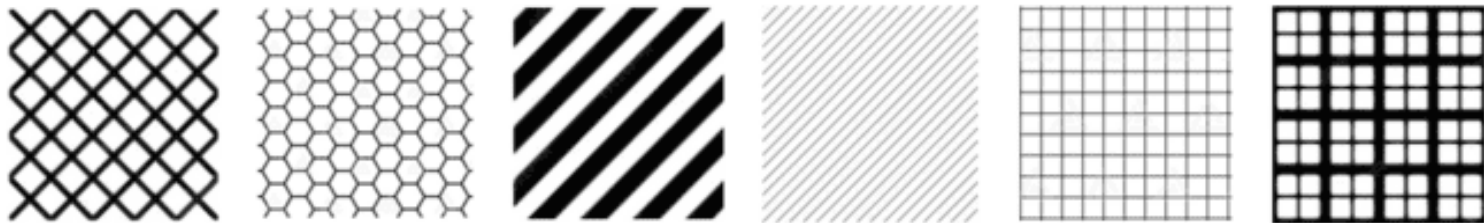
→ Q1 : Identifying the Most Representative Patterns



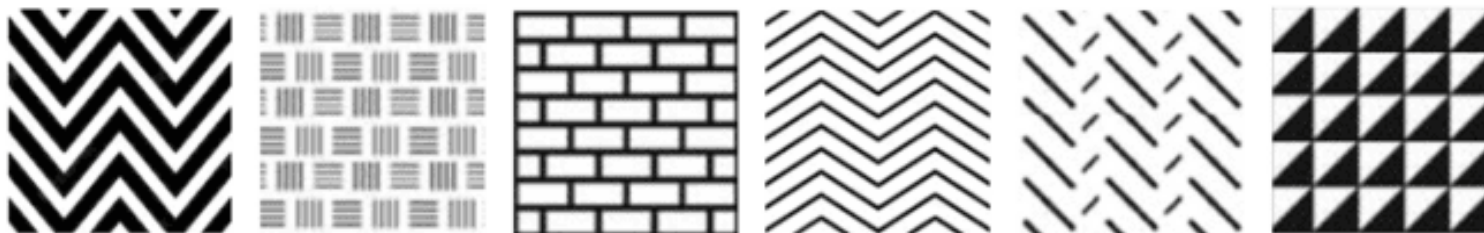
Water areas



Natural lands



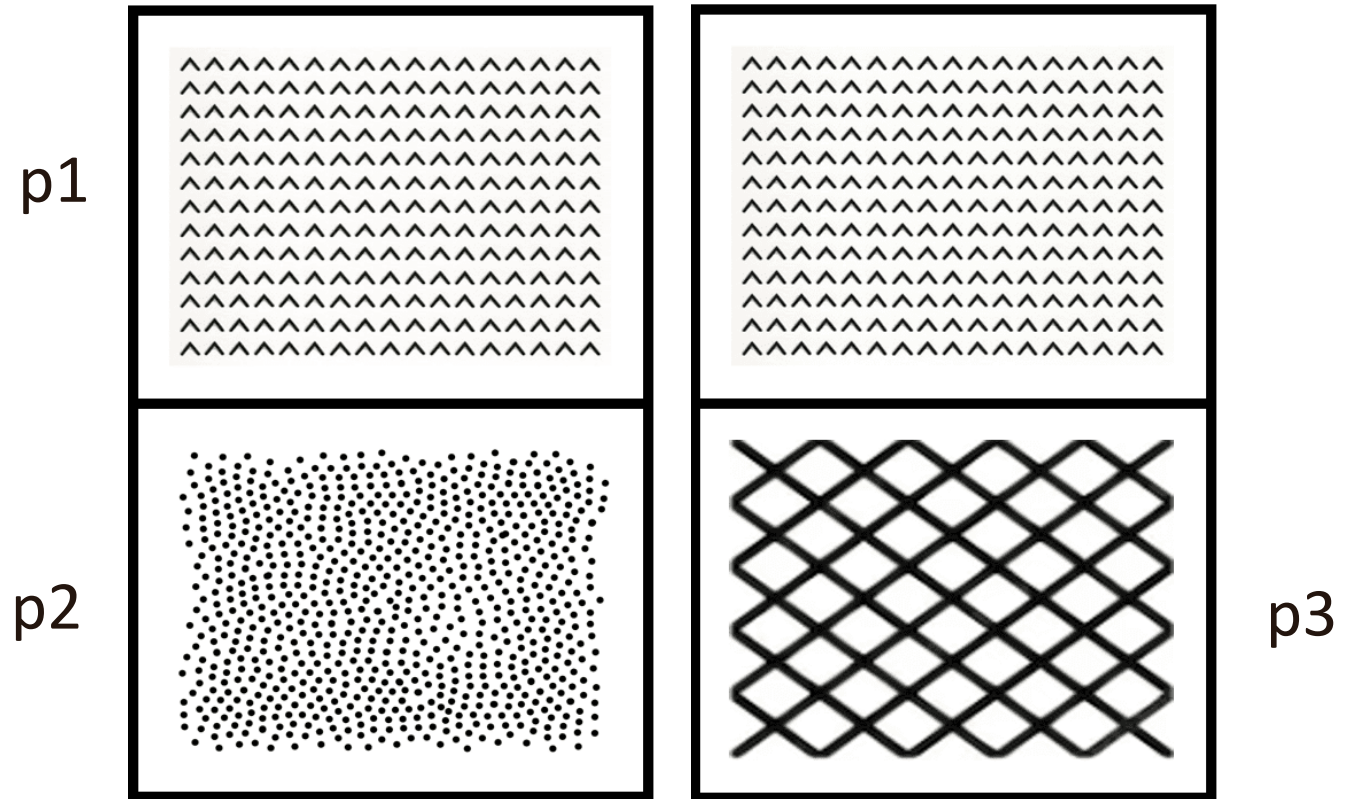
Urban areas



Industrial/ agricultural areas

→ Q2 : Formalizing the Perceptible Transition of Textures

- Haptic Perception Distance
- Relative Distances
- Tactile Domino Setting



Hypothesis : $HD(p1, p2) \leq HD(p1, p3)$

→ Planning of a User Study

→ PHASE 1 : patterns from different groups

1) H : Low haptic distances for same environment textures

2) H : density > correlation for point patterns

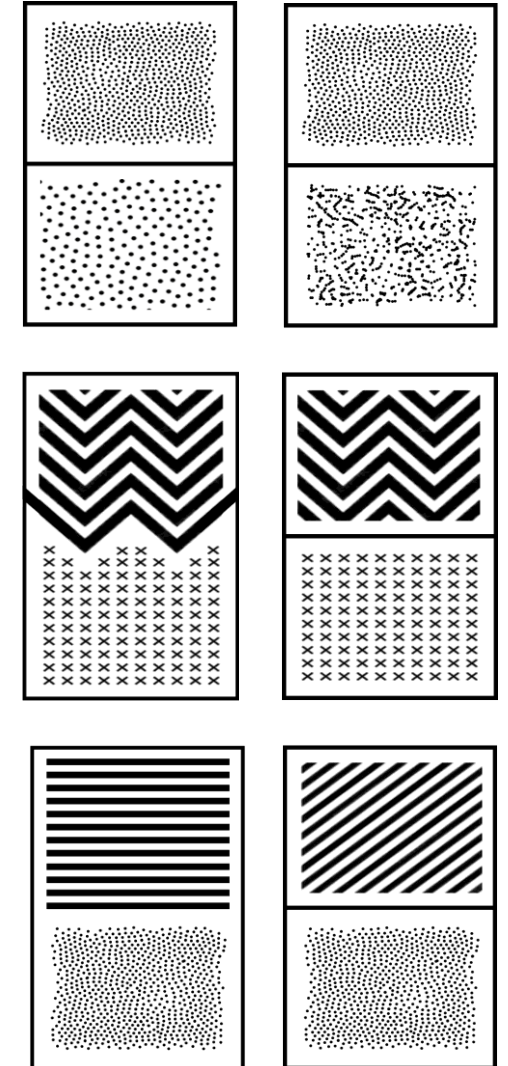
3) Threshold change of density for point patterns

4) Boundary choice for curved patterns

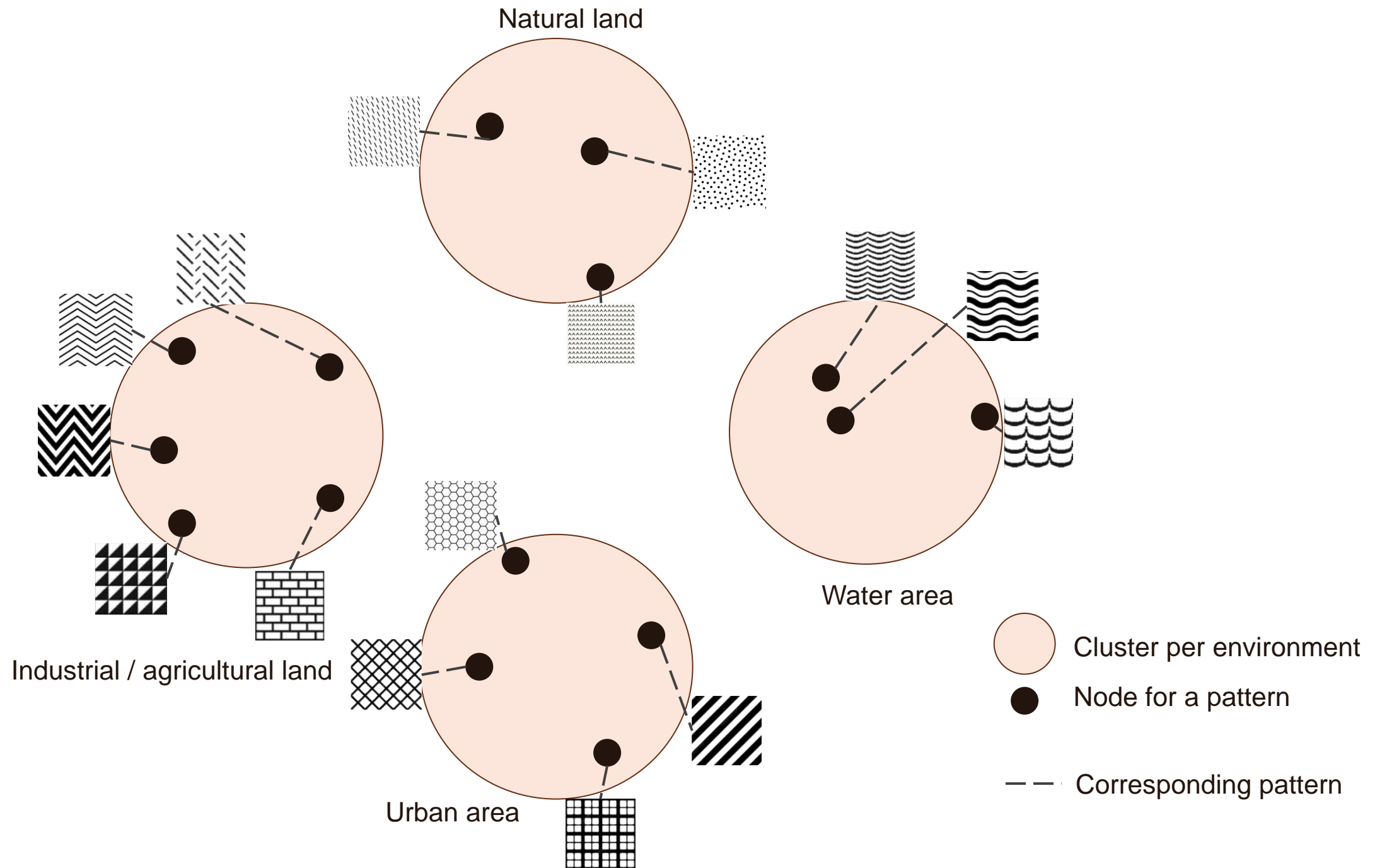
5) Boundary choice for hashes & optimal angle

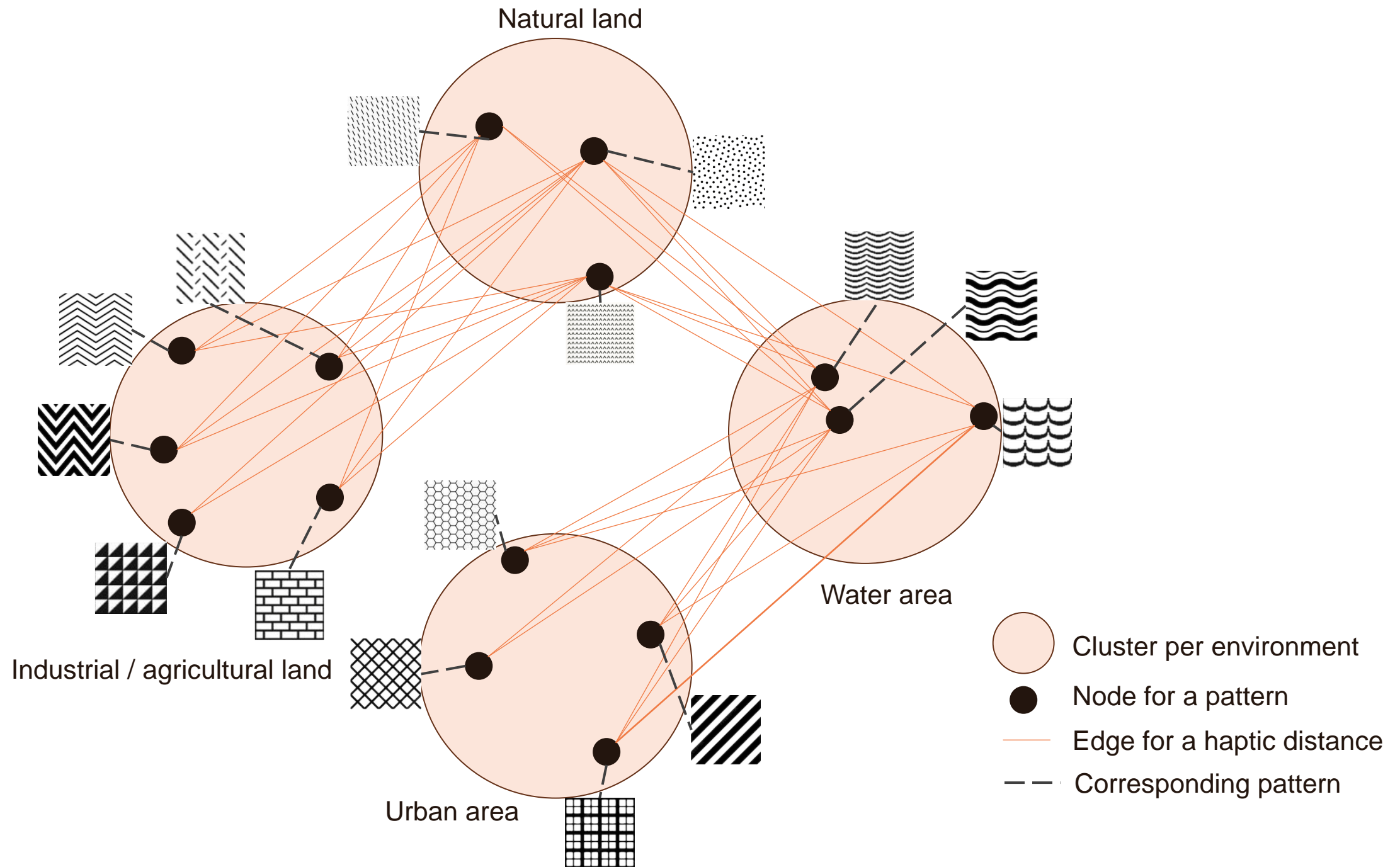
→ PHASE 2 : within environment groups

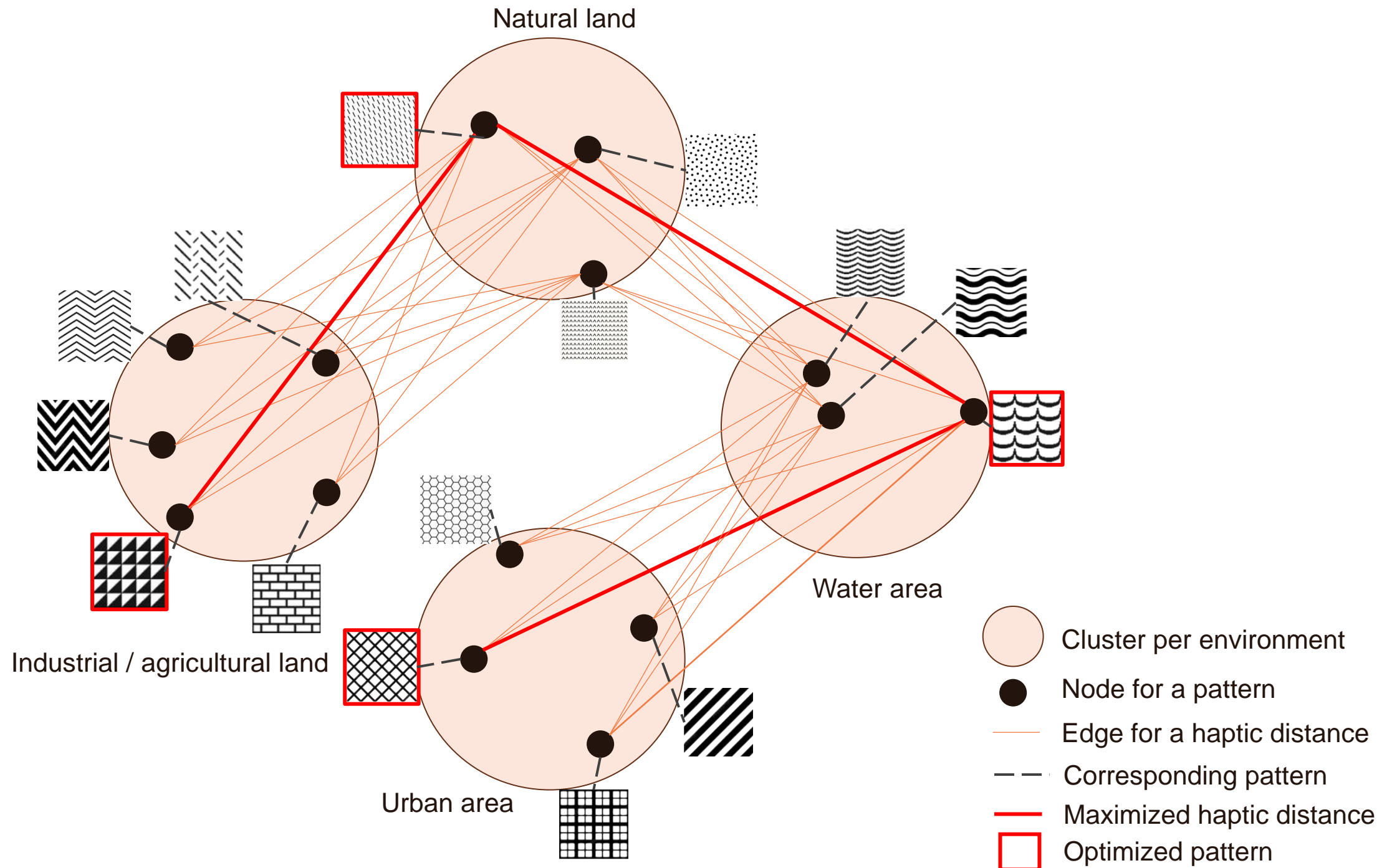
6) Most relevant pattern for each specification



Applications of the Concept of Haptic Distance







→ Conclusion & Future Work

Project zip file with patterns and “dominos”:



Thank you

