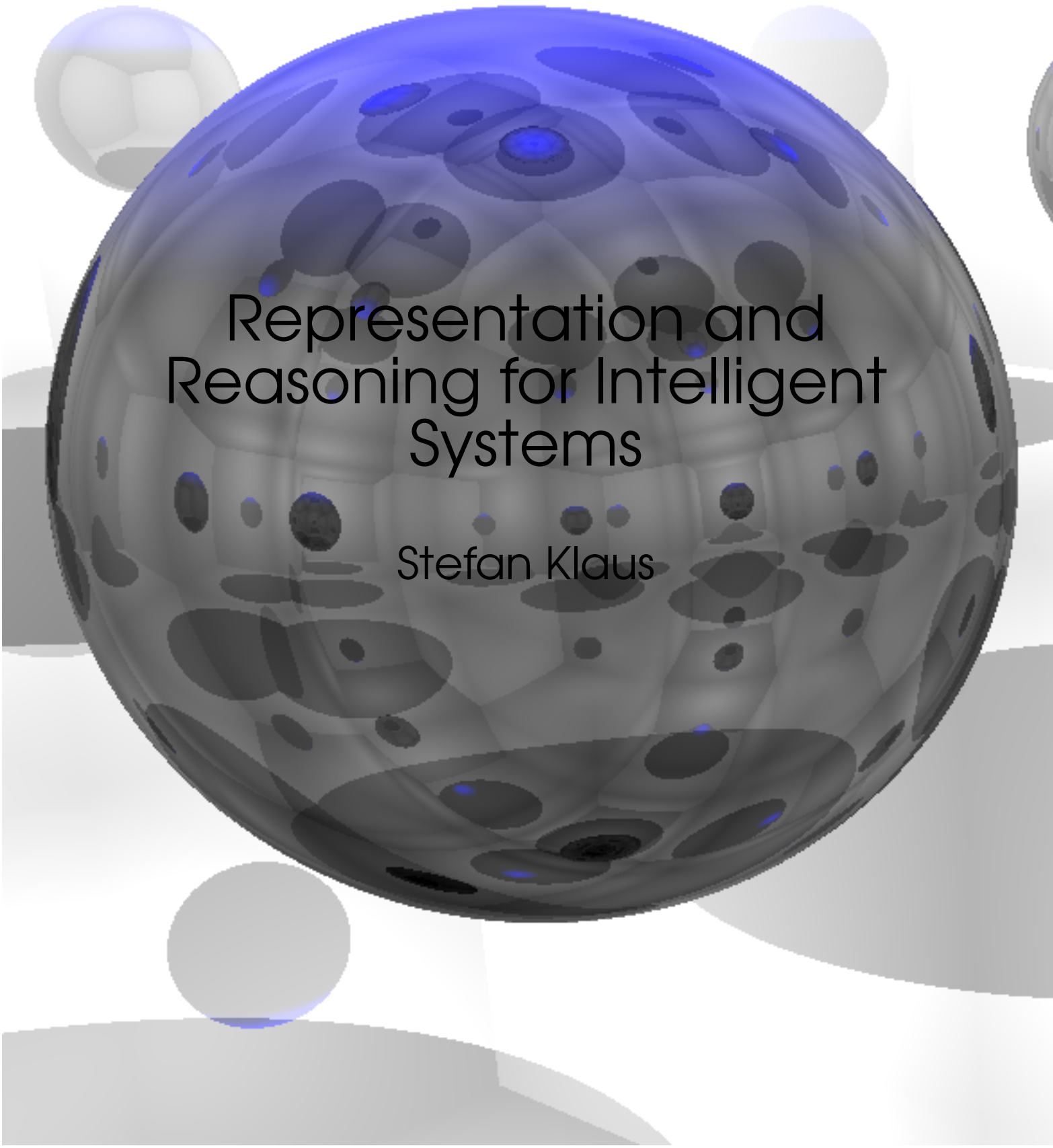

Representation and Reasoning for Intelligent Systems

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1. In-text Elements

1.1 Theorems

This is an example of theorems.

1.1.1 Several equations

This is a theorem consisting of several equations.

Theorem 1.1.1 — Name of the theorem. In $E = \mathbb{R}^n$ all norms are equivalent. It has the properties:

$$\big|\,||\mathbf{x}|| - ||\mathbf{y}||\,\big| \leq ||\mathbf{x}-\mathbf{y}|| \tag{1.1}$$

$$||\sum_{i=1}^{n} \mathbf{x}_i|| \leq \sum_{i=1}^{n} ||\mathbf{x}_i|| \quad \text{where } n \text{ is a finite integer} \tag{1.2}$$

1.1.2 Single Line

This is a theorem consisting of just one line.

Theorem 1.1.2 A set $\mathscr{D}(G)$ in dense in $L^2(G), |\cdot|_0$.

1.2 Definitions

This is an example of a definition. A definition could be mathematical or it could define a concept.

Definition 1.2.1 — Definition name. Given a vector space E, a norm on E is an application, denoted $||\cdot||$, E in $\mathbb{R}^+ = [0, +\infty[$ such that:

$$||\mathbf{x}|| = 0 \;\Rightarrow\; \mathbf{x} = \mathbf{0} \tag{1.3}$$

$$||\lambda \mathbf{x}|| = |\lambda| \cdot ||\mathbf{x}|| \tag{1.4}$$

$$||\mathbf{x}+\mathbf{y}|| \leq ||\mathbf{x}|| + ||\mathbf{y}|| \tag{1.5}$$

1.3 Notations

Notation 1.1. *Given an open subset G of $\mathbb{R}^n$, the set of functions φ are:*

1. *Bounded support G;*
2. *Infinitely differentiable;*

a vector space is denoted by $\mathscr{D}(G)$.

1.4 Remarks

This is an example of a remark.

R The concepts presented here are now in conventional employment in mathematics. Vector spaces are taken over the field $\mathbb{K} = \mathbb{R}$, however, established properties are easily extended to $\mathbb{K} = \mathbb{C}$.

1.5 Corollaries

This is an example of a corollary.

Corollary 1.5.1 — Corollary name. The concepts presented here are now in conventional employment in mathematics. Vector spaces are taken over the field $\mathbb{K} = \mathbb{R}$, however, established properties are easily extended to $\mathbb{K} = \mathbb{C}$.

1.6 Propositions

This is an example of propositions.

1.6.1 Several equations

Proposition 1.6.1 — Proposition name. It has the properties:

$$\big|\,||\mathbf{x}|| - ||\mathbf{y}||\,\big| \leq ||\mathbf{x}-\mathbf{y}|| \tag{1.6}$$

$$||\sum_{i=1}^{n} \mathbf{x}_i|| \leq \sum_{i=1}^{n} ||\mathbf{x}_i|| \quad \text{where } n \text{ is a finite integer} \tag{1.7}$$

1.6.2 Single Line

Proposition 1.6.2 Let $f, g \in L^2(G)$; if $\forall \varphi \in \mathscr{D}(G)$, $(f,\varphi)_0 = (g,\varphi)_0$ then $f = g$.

1.7 Examples

This is an example of examples.

1.7.1 Equation and Text

■ **Example 1.1** Let $G = \{x \in \mathbb{R}^2 : |x| < 3\}$ and denoted by: $x^0 = (1,1)$; consider the function:

$$f(x) = \begin{cases} \mathrm{e}^{|x|} & \text{si } |x-x^0| \leq 1/2 \\ 0 & \text{si } |x-x^0| > 1/2 \end{cases} \tag{1.8}$$

The function f has bounded support, we can take $A = \{x \in \mathbb{R}^2 : |x-x^0| \leq 1/2 + \varepsilon\}$ for all $\varepsilon \in]0; 5/2 - \sqrt{2}[$. ■

1.7.2 Paragraph of Text

■ **Example 1.2 — Example name.** Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

■

1.8 Exercises

This is an example of an exercise.

Exercise 1.1 This is a good place to ask a question to test learning progress or further cement ideas into students' minds. ■

1.9 Problems

Problem 1.1 What is the average airspeed velocity of an unladen swallow?

1.10 Vocabulary

Define a word to improve a students' vocabulary.
Vocabulary 1.1 — Word. Definition of word.

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2.1 Theorems

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