Université Toulouse III – Paul sabatier
L2 Informatique

Structures de données

Semestre 4

Toulouse, le 30 janvier 2013

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Chapitre 1

Interpolation polynomiale

$$
\begin{aligned}
A &= \{a_0, \cdots, a_d\} \\
lg, d(x) &= \frac{(x-a_0)\cdots(x-a_j-1)(x-a_{j+1)}\cdots(x-a_j)}{a_j-a_0)\cdots(a_j-a_{j-1})(a_{j+1})\cdots(a_j-a_d)}
\end{aligned}
$$

Intérpolation $f_0 f_1 \cdots f_d$

$$L(a_j, f_j) = p(x) = \sum_{j=0}^{d} f_j l_{j,d}(x)$$

1.1 Propriétés de l'interpolation de Lagrange

1.1.1

$$\left.\begin{array}{c} P(x) \in P_d \\ P(a_i) = f(a_i), i = 0, 1, \cdots, d \end{array}\right\} \Leftrightarrow p(x) = L[a_0, a_1, \cdots, a_d; f]$$

$$L[a_0, a_1, \cdots, a_d; P] = P$$

1.1.2

$$
\begin{aligned}
&\forall d \in \mathbb{N}, \forall x \in \mathbb{R} \Rightarrow \sum_{j=0}^{d} l_j, d(x) = 1 \\
&d = 1, a_0, a_1 \\
&l_{0,1}(x) + l_{1,1} = \frac{x-a_1}{a_0-a_1} + \frac{x-a_0}{a_1-a_0} = \frac{x-a_1-x+a_0}{a_0-a_1} = 1 \\
&1 \equiv l_O = L[a_0, a1, \cdots, a_d; l_0] = \sum_{j=0}^{d} l_O(a_j) \times l_{j,d}(x) = \sum_{j=0}^{d} l_{j,d}(x)
\end{aligned}
$$

1.1.3

$$A = \{a_0, a_1, \cdots, a_d\} \in \mathbb{R}, f : \mathbb{R} \to \mathbb{R}, g : \mathbb{R} \to \mathbb{R}$$

$$L[a_0, a_1, \cdots, a_d, f + g] = L[a_0, a_1, \cdots, a_d; f] + L[a_0, a_1, \ldots, a_d; g]$$
$$\sum_{j=0}^{d} (f + g)(a_j) = \sum_{j=0}^{d} [f(a_j) + g(a_j)] l_{j,d}(x)$$
$$\sum_{j=0}^{d} f(a_j); l_{j,d} + \sum_{j=0}^{d} g(a_j) l_{j,d}(x)$$

Annexe A

Liste des codes sources

Annexe B

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