

Pyre User Interfaces, etc.

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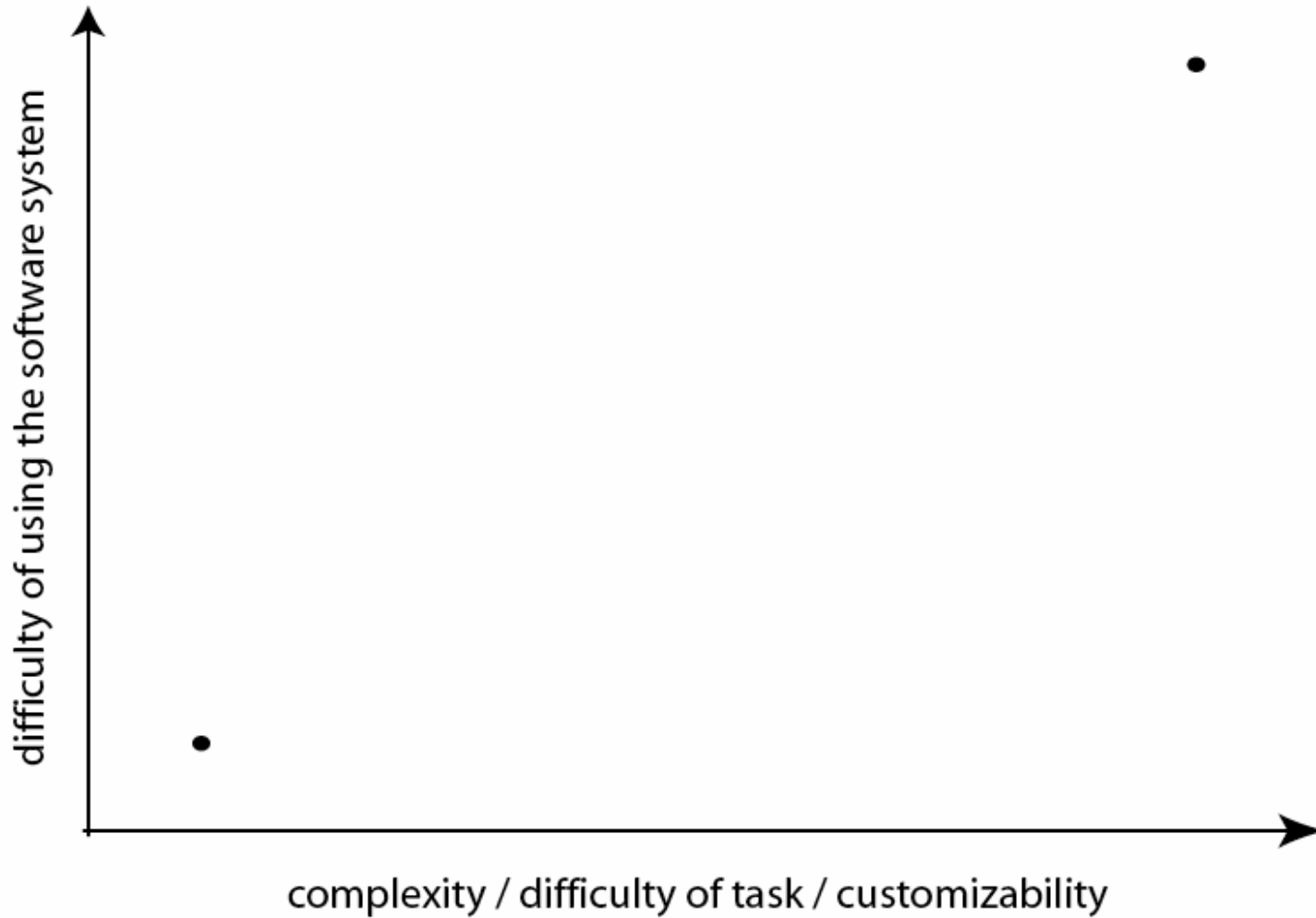
California Institute of Technology

Danse Developers Workshop

January 22-23, 2007



Homotopy and you.



User interfaces prototypes

- Pyre command line
 - `Integrator.py --func=myfunc --technique=trapezoidal --lower=0 --upper=1 --trapezoidal.n=1000`
 - `Integrator.py --func=stringfunc --stringfunc.str='sin(x) * cos(x)^2' --technique=romberg --romberg.maxlevels=10`
 - Interpreter level / shell level
- First prototypes (wx, text, etc.) (with Jiao Lin)
 - Demands nothing
 - Provides ... a little
 - Demo later
- Web prototype
 - Client-side: HTML/Javascript
 - Server-side: cgi scripting with python
 - Self-hosting
 - Many alternatives exist, rapidly evolving field.

Some (UI related) Use Cases

- Dynamic / visual scripting
 - Visual programming environment
 - Labview, Explorer, Simulink, Amira, etc.
 - Python universe: vision, vistrails
 - Framework level changes required.
- Effects of algorithms
 - Changing integration algorithm ?
 - Using another renderer ?
 - No problems. Static wiring, static but open “slots” for components.
- Batch processing
 - of images, etc ?
 - Scripts !
- Database access, staging, authentication, sessions, etc. ?
 - SNS Portal, Pyre, Middleware ...

Estimating functional dependencies

- Example interpretation: function fitting

- Given experimental data, find a best fit polynomial
- Picking the order
- Picking the coefficients

- Given empirical observations

$$(\mathbf{x}_1, \mathbf{y}_1), (\mathbf{x}_2, \mathbf{y}_2), (\mathbf{x}_3, \mathbf{y}_3), \dots, (\mathbf{x}_n, \mathbf{y}_n)$$

- and a set of functions indexed by parameter alpha $\mathbf{F}(\mathbf{x}, \alpha)$

- Minimize the functional (aka expected risk)

$$\mathbf{I}(\alpha) = \int \mathbf{Q}(\mathbf{x}, \alpha) \mathbf{P}(\mathbf{x}) d\mathbf{x}$$

- A common loss function

$$\mathbf{Q}(\mathbf{x}, \alpha) = (\mathbf{y} - \mathbf{F}(\mathbf{x}, \alpha))^2$$

Parametric fitting: density function

- Typically Ill-posed
 - Occam's razor, Kolmogorov complexity, minimum description length, ...

