



由于人与人之间输入法的多样性,
如何知道/确保他们表示相同的意义?

方法 \rightarrow 规范形式 (canonical form)

$Serves(x, VegetarianFood)$
 \swarrow Restaurant 中的 Maharani } 实体替换.
 \searrow 在此表示变量 (variable)

饭店领域的一个模型 =

Domain 域	$\mathcal{D} = \{a, b, c, d, e, f, g, h, i, j\}$
Matthew, Franco, Katie and Caroline	a, b, c, d
Frasca, Med, Rio	e, f, g
Italian, Mexican, Eclectic	h, i, j
Properties 属性	
Noisy	$Noisy = \{e, f, g\}$
Frasca, Med, and Rio are noisy	
Relations 关系	
Likes (动词)	$Likes = \{\langle a, f \rangle, \langle c, f \rangle, \langle c, g \rangle, \langle b, e \rangle, \langle d, f \rangle, \langle d, g \rangle\}$
Matthew likes the Med	
Katie likes the Med and Rio	
Franco likes Frasca	
Caroline likes the Med and Rio	
Serves (动词)	$Serves = \{\langle f, j \rangle, \langle g, i \rangle, \langle e, h \rangle\}$
Med serves eclectic	
Rio serves Mexican	
Frasca serves Italian	

Figure 16.2 A model of the restaurant world.

用 FOL 表示 Relation -

1. $LocationOf(Frasca)$ 所属格.
2. $Serves(Maharani, VegetarianFood)$ 事物之间的关系 (多个事物)
3. $*Restaurant(Maharani)$ 主谓关系 (单独一个事物的性质)

↓ 再通过逻辑连词 =

1. \neg 或 \wedge 或 \exists Δ

↓ e.g. 1

$Have(Speaker, FiveDollars) \wedge \neg Have(Speaker, LotOfTime)$

等于: I only have five dollars and I don't have a lot of time.

e.g. 2 $\exists x Restaurant(x) \wedge Serves(x, MexicanFood)$

$\wedge Near(LocationOf(x), LocationOf(ICSI))$

等于: A restaurant that serves Mexican food near ICSI.

18.2 (17.3.3) π -reducing

π notation

$\pi x. P(x)$

↓ 用指定的FOL项替换、随之去掉 π .

$\pi x. P(x)(A)$

$P(A)$

↓ 变形版 = 柯里化 (currying) — 作用: 将多元谓词转换为一系列单元谓词.

$\pi x. \pi y. \text{Near}(x, y)(\text{Bacaro})$

$\pi y. \text{Near}(\text{Bacaro}, y)$

↓ $\pi y. \text{Near}(\text{Bacaro}, y)(\text{Centro})$

$\text{Near}(\text{Bacaro}, \text{Centro})$

17.3.5

Modus Ponens 取对推理. (本质上就是三段论的推理方式)

Formula = $\frac{\alpha \quad \alpha \Rightarrow \beta}{\beta}$

17.4.1

Temporal logic 时序逻辑

1. I arrived

$\exists e, i, n, t \text{ Arriving}(e) \wedge \text{IntervalOf}(e, i) \wedge \text{EndPoint}(i, e) \wedge \text{Precedes}(e, \text{Now})$

2. I am arriving

$\exists e, i, n, t \text{ Arriving}(e) \wedge \text{IntervalOf}(e, i) \wedge \text{MemberOf}(i, \text{Now})$ 即 $i = \text{now}$ 进行中.

3. I will arrive

$\exists e, i, n, t \text{ Arriving}(e) \wedge \text{IntervalOf}(e, i) \wedge \text{EndPoint}(e, n) \wedge \text{Precedes}(\text{Now}, e)$

↓

?

interval i 结束了, 再到 e .

在 Now 之前.

即 $i = \text{now}$ 进行中.

n 是来自于啥的?

(16.47) I arrived in New York.

(16.48) I am arriving in New York.

(16.49) I will arrive in New York.

$\exists e, i, n \text{ Arriving}(e) \wedge \text{Arriver}(e, \text{Speaker}) \wedge \text{Destination}(e, \text{NewYork})$
 $\wedge \text{IntervalOf}(e, i) \wedge \text{EndPoint}(i, n) \wedge \text{Precedes}(n, \text{Now})$

$\exists e, i, n \text{ Arriving}(e) \wedge \text{Arriver}(e, \text{Speaker}) \wedge \text{Destination}(e, \text{NewYork})$
 $\wedge \text{IntervalOf}(e, i) \wedge \text{MemberOf}(i, \text{Now})$

$\exists e, i, n \text{ Arriving}(e) \wedge \text{Arriver}(e, \text{Speaker}) \wedge \text{Destination}(e, \text{NewYork})$
 $\wedge \text{IntervalOf}(e, i) \wedge \text{EndPoint}(i, n) \wedge \text{Precedes}(\text{Now}, n)$