

How I Learned to Stop Worrying and LoveTemporally Qualified Continuants

May 14, 2013

- Is there the universal Man with Diabetes Living in Detroit? No.
- Is it useful in English to have these noun phrases? Yes.
- Are there temporally quantified continuants like Barry at 11 am? No.
- Is it useful to have them in OWL? Yes.

What are Temporally Quantified Continuants (TQCs)

- informally: a continuant particular at a given time interval
- examples: Barry at 11 am, Buffalo during the 19th century
- formal semantics: an ordered pair of a continuant particular and a time interval

What are Temporally Quantified Continuants

- Notation: $\langle c, t \rangle$ for the temporally quantified continuant consisting of the c and interval t .
- Function: $\text{has_cont}(\langle c, t \rangle) = c$
- Function $\text{has_time}(\langle c, t \rangle) = t$

TQCs are ontologically under control

- Extensional identity criterion:
 - $(x = y)$ iff $(\text{has_cont}(x) = (\text{has_cont}(y)) \ \& \ (\text{has_time}(x) = \text{has_time}(y)))$
- Clear existence criterion
 - $\forall x \forall t (\text{Continuant}(x) \ \& \ \text{TemporalRegion}(t) \ \& \ \text{exists_at}(x,t) \leftrightarrow \exists y (\text{TQC}(y) \ \& \ (y = \langle x, t \rangle))$

- Every time indexed ternary relationship between continuants can be used to define a binary relationship between the
- Examples:
- `tqc_instance_of(Human, <fabian, now>)` iff `instance_of(Human, fabian, now)`
- `tqc_part_of(<my_hand, now>, <my_arm, now >)` iff `continuant_part_of(my_hand, my_arm, now)`

Example Instantiation of non-rigid classes

- 1 All professors are academics.
- 2 $\text{Professor}_{\text{TQC}}$ subClassOf $\text{Academic}_{\text{TQC}}$
- 3 $\forall x(\text{Professor}_{\text{TQC}}(x) \rightarrow \text{Academic}_{\text{TQC}}(x))$
- 4 $\forall y \forall t(\text{Professor}(y, t) \rightarrow \text{Academic}(y, t))$