Bare Demo of IEEEtran.cls for IEEE Computer Society Conferences

Daniella Angelos
School of Electrical and Computer Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332–0250
Email: http://www.michaelshell.org/contact.html

Cláudia Nalon
Twentieth Century Fox
Springfield, USA
Email: homer@thesimpsons.com
Fax: (888) 555–1212

***Abstract*—The abstract goes here.**

1. Introduction

This demo file is intended to serve as a "starter file" for IEEE Computer Society conference papers produced under LaTeX using IEEEtran.cls version 1.8b and later. I wish you the best of success.

mds
August 26, 2015

1.1. Subsection Heading Here

Subsection text here.

1.1.1. Subsubsection Heading Here. Subsubsection text here.

2. Language

The Modal Language K_n is equivalent to its set of *well-formed formulae*, denoted WFF_{K_n}, which is constructed from an enumerable set of *propositional symbols*:

$$\mathcal{P} = \{p, q, r, \ldots\}, \tag{1}$$

the negation symbol $\neg$, the disjunction symbol $\vee$ and the modal connective $\boxed{a}$, that expresses the notion of necessity, for each index (or agent) a in a finite, fixed set:

$$\mathcal{A} = \{1, \ldots, n\}, n \in \mathbb{N} \tag{2}$$

The propositional symbols combined with the logic operators, represented by the symbols mentioned above, are arranged to form sentences (also, parentheses can be used to avoid ambiguity). Therefore, the set of WFF_{K_n} is recursively defined as showed in 2.1.

Definition 2.1. *The set of well-formed formulae, WFF_{K_n}, is the least set such that:*

1) $\mathcal{P} \subset WFF_{\mathsf{K}_n}$
2) *if $\varphi, \psi \in WFF_{\mathsf{K}_n}$, then so are $\neg\varphi, (\varphi \vee \psi)$ and $\boxed{a}\varphi$, for each $a \in \mathcal{A}$*

As one might know, other logic operators may be introduced as abbreviation to formulae constructed using the operators defined as the usual. In particular, this paper considers the following abbreviations:

1) $\varphi \wedge \psi = \neg(\neg\varphi \vee \neg\psi)$ (conjuction)
2) $\varphi \Rightarrow \psi = \neg\varphi \vee \psi$ (implication)
3) $\varphi \Leftrightarrow \psi = (\varphi \Rightarrow \psi) \wedge (\psi \Rightarrow \varphi)$ (equivalence)
4) $\Diamond_a \varphi = \neg\boxed{a}\neg\varphi$ (possibility)
5) **false** $= \varphi \wedge \neg\varphi$ (*falsum*)
6) **true** $= \neg$**false** (*verum*)

And the precedence of the operators is as follows:

1) $\neg, \boxed{a}, \Diamond_a$
2) $\wedge$
3) $\vee$
4) $\Rightarrow, \Leftrightarrow$

Logics that involve n agents in the modal logic, with $n \in \mathbb{N}$, are know as Multimodal Logics. When $n = 1$, we often omit the index in the modal operators, i.e., we just write $\Box$ and $\Diamond$.

The maximal number of modal operators in a formula is defined as its *modal depth* and denoted $mdepth$. The maximal number of modal operators in which scope the formula occurs is defined as the *modal level* of that formula, and it is denoted $mlevel$. For instance, in $\boxed{a}\Diamond_a p$, $mdepth(p) = 0$ and $mlevel(p) = 2$.

2.1. Semantics

Definition 2.2. *A Kripke model for the set of propositional symbols $\mathcal{P}$ and the agents $\mathcal{A}$ is given by the tuple $\mathcal{M} = (W, w_0, R_1, \ldots, R_n, \pi)$, where W is a non-empty set of possible worlds with a distinguinshed world w_0, each $R_a, a \in \mathcal{A}$, is a binary relation on W, and $\pi : W \times \mathcal{P} \longrightarrow \{false, true\}$ is the valuation function that associates to each world $w \in W$ a truth-assignment to propositional symbols.*

From the definition of a Kripke model, one can define the satisfiability and validity of a formula in K_n.

Definition 2.3. *Let* $\mathcal{M} = (W, w_0, R_1, \ldots, R_n, \pi)$ *be a Kripke model for* $\mathcal{P}$ *and* $\mathcal{A}$*, and consider* $w \in W, p \in \mathcal{P}$ *and* $\varphi, \psi \in WFF_{\mathsf{K}_n}$*. The* satisfiability relation*, denoted by* $\langle \mathcal{M}, w \rangle \models \varphi$*, among the world* w *and a formula* φ *in the model* $\mathcal{M}$*, is inductively defined by:*

1) $\langle \mathcal{M}, w \rangle \models p$ *if, and only if,* $\pi(w, p) =$ ***true***
2) $\langle \mathcal{M}, w \rangle \models \neg\varphi$ *if, and only if,* $\langle \mathcal{M}, w \rangle \not\models \varphi$
3) $\langle \mathcal{M}, w \rangle \models \varphi \vee \psi$ *if, and only if,* $\langle \mathcal{M}, w \rangle \models \varphi$ *or* $\langle \mathcal{M}, w \rangle \models \psi$
4) $\langle \mathcal{M}, w \rangle \models \boxed{a}\varphi$ *if, and only if,* $\forall\ t \in W$*, with* $a \in \mathcal{A}$*,* $(w, t) \in R_a$ *implies* $\langle \mathcal{M}, t \rangle \models \varphi$

A set of formulae $\Gamma = \{\gamma_1, \ldots, \gamma_r\}, r \in \mathbb{N}$, is satisfiable in a world w if, and only if, each of its formulae is satisfiable in this world, i.e., $\langle \mathcal{M}, w \rangle \models \Gamma \Leftrightarrow \langle \mathcal{M}, w \rangle \models \gamma_1 \wedge \ldots \wedge \gamma_r$

Definition 2.4. *A formula* $\varphi \in WFF_{\mathsf{K}_n}$ *is said to be* satisfiable *if exists a Kripke model* $\mathcal{M}$ *such that* $\langle \mathcal{M}, w_0 \rangle \models \varphi$*.*

Definition 2.5. *A formula* $\varphi \in WFF_{\mathsf{K}_n}$ *is said to be* valid *if for all Kripke model* $\mathcal{M}$*, we have that* $\langle \mathcal{M}, w_0 \rangle \models \varphi$*.*

When one is considering a set of formulae instead of a single one, both definitions of satisfiability and validity holds similarly to the definition of satisfiability relation.

3. Calculus

4. Related Work

5. Conclusion

The conclusion goes here.

Acknowledgments

The authors would like to thank...

References

[1] H. Kopka and P. W. Daly, *A Guide to LaTeX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.