Status of the AMT models

0.1 Status of the Models

Ther description of a model implementation in the AMToolbox context can only be a snapshot of the development since the implementations in the toolbox are continuously developed, evaluated, and improved. In order to provide an overview of the development stage, a rating system is used in the AMToolbox.

First, we rate the implementation of the model by considering its source code and documentation.

☆ ☆ ☆   *Submitted*   The model has been submitted to the AMToolbox, there is, however, no working code/documentation in the AMToolbox, or there are compilation errors, or some libraries are missing. The model neither appears on the website nor is available for download

★ ☆ ☆   *OK*   The code fits the AMToolbox conventions just enough for being available for download. The model and its documentation appear on the website, but major work is still required

★ ★ ☆   *Good*   The code/documentation follows our conventions, but there are open issues

★ ★ ★   *Perfect*   The code/documentation is fully up to our conventions, no open issues

Second, the implementation versus the corresponding publication is verified in experiments. In the best case, the experiments produce the same results as in the publication – up to some minor layout issues in the graphical representations. Verifications are rated at the following levels.

☆ ☆ ☆   *Unknown*   The AMToolbox can not run experiments for this model and can not produce results for the verification. This might be the case when the verification code has not been provided yet

★ ☆ ☆   *Untrusted*   The verification code is available but the experiments do not reproduce the relevant parts of the publication (yet). The current implementation can not be trusted as a basis for further developments

★ ★ ☆   *Qualified*   The experiments produce similar results as in the publication in terms of showing trends and explaining the effects, but not necessarily matching the numerical results. Explanation for the differences can be provided, for example, not all original data available, or publication affected by a known and documented bug

★ ★ ★   *Verified*   The experiments produce the same results as in the publication. Minor differences are allowed if randomness is involved in the model, for instance, noise as input signal, probabilistic modeling approaches, and a plausible explanation is provided

0.2 AMT Version 0.9.7 (current version)

Table 1: Model status, version 0.9.7 (current). D: Rating for the model documentation. C: Rating for the model source code. V: Rating for the model verification with experiments.

Model		Rating		
Name	Function	D	C	V
Peripheral models				
Continuous-azimuth HRTFs	enzner2008	★★☆	★★☆	★★☆
Directional time-of-arrival (on-axis)	ziegelwanger2013	★★★	★★★	★★★
Directional time-of-arrival in HRTFs (off-axis, robust)	ziegelwanger2014	★★★	★★★	★★★
Gammatone filterbank	gammatone	★★★	★★★	★★★
Invertible Gammatone filterbank	hohmann2002, gfb_	★★☆	★☆☆	★★★
Dual-resonance nonlin. filterbank	lopezpoveda1986, drnl	★★★	★★★	★★☆
Cochlear transmission-line model	verhulst2012	★★★	★★★	★★★
Auditory-nerve filterbank (cat version)	zilany2007humanized	☆☆☆	★☆☆	☆☆☆
Auditory-nerve filterbank (human version)	zilany2014	★★☆	★★☆	☆☆☆
Inner hair cell	ihcenvelope	★★★	★★★	☆☆☆
Adaptation loops	adaptloop	★★★	★★★	☆☆☆
Modulation filterbank	modfilterbank	★★★	★★★	☆☆☆
Auditory brainstem responses	roenne2012	★★☆	★★☆	★★★
Signal detection models				
Monaural masking (preprocessing stage only)	dau1997preproc	★★★	★★★	☆☆☆
Binaural signal detection (preprocessing stage only)	breebaart2001preproc	★★★	★★★	☆☆☆
Spatial models				
Lateralization, cross-correlation	lindemann1986	★★★	★★★	★★☆
Concurrent-speakers lateral direction	dietz2011	★★★	★★★	★★★
Binaural scene analysis	spille2013	★☆☆	★☆☆	★★★
Lateralization in sound reproduction systems	wierstorf2013	★★★	★★★	★★★
Lateralization, supervised training	may2011	★★☆	★★☆	☆☆☆
Binaural activity map	takanen2013	★★★	★★★	★★★
Median-plane localization	langendijk2002	★★☆	★★★	★★★
Sagittal-plane localization (simple)	baumgartner2013	★★★	★★★	★★★
Sagittal-plane localization	baumgartner2014	★★★	★★★	★★★
Distance perception	georganti2013	★★☆	★★☆	★★★
Speech perception models				
Intelligibility in noise	joergensen2011, joergensen2013	★☆☆	★☆☆	★★★
Short-time objective intelligibility	taal2011	★☆☆	★☆☆	☆☆☆
Spatial unmasking	jelfs2011	★★☆	★★★	★★☆

0.3 AMT Version 0.9.6 (previous version)

Table 2: Model status, version 0.9.6. D: Rating for the model documentation. C: Rating for the model source code. V: Rating for the model verification with experiments.

Model		Rating		
Name	Function	D	C	V
Peripheral models				
Continuous-azimuth HRTFs	enzner2008	★★☆	★★☆	★★☆
Directional time-of-arrival (on-axis)	ziegelwanger2013	★★★	★★★	★★★
Directional time-of-arrival in HRTFs (off-axis, robust)	ziegelwanger2014	★★★	★★★	★★★
Gammatone filterbank	gammatone	★★★	★★★	★★★
Invertible Gammatone filterbank	hohmann2002	★★☆	★★☆	★★☆
Dual-resonance nonlin. filterbank	drnl	★★★	★★★	★★☆
Cochlear transmission-line model	verhulst2012	★★☆	★★☆	★★☆
Auditory-nerve filterbank (cat version)	zilany2007humanized	☆☆☆	★☆☆	☆☆☆
Inner hair cell	ihcenvelope	★★★	★★★	☆☆☆
Adaptation loops	adaptloop	★★★	★★★	☆☆☆
Modulation filterbank	modfilterbank	★★★	★★★	☆☆☆
Auditory brainstem responses	roenne2012	★★☆	★★☆	★★★
Signal detection models				
Monaural masking (preprocessing stage only)	dau1997preproc	★★★	★★★	☆☆☆
Binaural signal detection (preprocessing stage only)	breebaart2001preproc	★★★	★★★	☆☆☆
Spatial models				
Lateralization, cross-correlation	lindemann1986	★★★	★★★	★★☆
Concurrent-speakers lateral direction	dietz2011	★★★	★★★	★★★
Lateralization in sound reproduction systems	wierstorf2013	★★★	★★★	★★★
Lateralization, supervised training	may2011	★☆☆	★☆☆	☆☆☆
Binaural activity map	takanen2013	★★★	★☆☆	★★★
Median-plane localization	langendijk2002	★★☆	★★★	★★★
Sagittal-plane localization (simple)	baumgartner2013	★★★	★★★	★★★
Sagittal-plane localization	baumgartner2014	★★★	★★★	★★★
Distance perception	georganti2013	☆☆☆	☆☆☆	☆☆☆
Speech perception models				
Intelligibility in noise	joergensen2011	★☆☆	★☆☆	★★★
Short-time objective intelligibility	taal2011	★☆☆	★☆☆	☆☆☆
Spatial unmasking	jelfs2011	★★☆	★★★	★★☆

0.4 AMT Version 0.9.5 (outdated version)

Table 3: Model status, version 0.9.5. D: Rating for the model documentation. C: Rating for the model source code. V: Rating for the model verification with experiments.

Model		Rating		
Name	Function	D	C	V
Peripheral models				
Continuous-azimuth HRTFs	`enzner2008`	★★☆	★★☆	★★☆
Directional time-of-arrival (on-axis)	`ziegelwanger2013`	★★★	★★★	★★★
Directional time-of-arrival in HRTFs (off-axis, robust)	`ziegelwanger2014`	★★★	★★★	★★★
Gammatone filterbank	`gammatone`	★★★	★★★	☆☆☆
Invertible Gammatone filterbank	`hohmann2002`	★☆☆	★☆☆	★★☆
Dual-resonance nonlin. filterbank	`drnl`	★★★	★★★	★★☆
Cochlear transmission-line model	`verhulst2012`	★★☆	★★☆	★★☆
Auditory-nerve filterbank	`zilany2007humanized`	☆☆☆	★☆☆	☆☆☆
Inner hair cell	`ihcenvelope`	★★★	★★★	☆☆☆
Adaptation loops	`adaptloop`	★★★	★★★	☆☆☆
Modulation filterbank	`modfilterbank`	★★★	★★★	☆☆☆
Auditory brainstem responses	`roenne2012`	★★☆	★★☆	★★★
Signal detection models				
Monaural masking (preprocessing stage only)	`dau1997preproc`	★★★	★★★	☆☆☆
Binaural signal detection (preprocessing stage only)	`breebaart2001preproc`	★★★	★★★	☆☆☆
Spatial models				
Lateralization, cross-correlation	`lindemann1986`	★★★	★★★	★★☆
Concurrent-speakers lateral direction	`dietz2011`	★★★	★★★	★★★
Lateralization in sound reproduction systems	`wierstorf2013`	☆☆☆	☆☆☆	☆☆☆
Lateralization, supervised training	`may2011`	★☆☆	★☆☆	☆☆☆
Binaural activity map	`takanen2013`	★★★	★☆☆	★★★
Median-plane localization	`langendijk2002`	★★☆	★★★	★★★
Sagittal-plane localization (simple)	`baumgartner2013`	★★★	★★★	★★★
Sagittal-plane localization	`baumgartner2014`	★★★	★★★	★★★
Distance perception	`georganti2013`	★☆☆	★☆☆	☆☆☆
Speech perception models				
Intelligibility in noise	`joergensen2011`	★☆☆	★☆☆	★★★
Short-time objective intelligibility	`taal2011`	★☆☆	★☆☆	☆☆☆
Spatial unmasking	`jelfs2011`	★★☆	★★★	★★☆

0.5 AMT Version 0.9.2 (outdated version)

Table 4: Model status, version 0.9.2. D: Rating for the model documentation. C: Rating for the model source code. V: Rating for the model verification with experiments.

Model		Rating		
Name	Function	D	C	V
Peripheral models				
Continuous-azimuth HRTFs	enzner2008	★★☆	★★☆	★★☆
Directional time-of-arrival	ziegelwanger2013	★★★	★★★	★★★
Gammatone filterbank	gammatone	★★★	★★★	☆☆☆
Invertible Gammatone filterbank	hohmann2002	★☆☆	★☆☆	★★☆
Dual-resonance nonlin. filterbank	drnl	★★★	★★★	★★☆
Cochlear transmission-line model	verhulst2012	☆☆☆	★☆☆	☆☆☆
Auditory-nerve filterbank	zilany2007humanized	☆☆☆	★☆☆	☆☆☆
Inner hair cell	ihcenvelope	★★★	★★★	☆☆☆
Adaptation loops	adaptloop	★★★	★★★	☆☆☆
Modulation filterbank	modfilterbank	★★★	★★★	☆☆☆
Auditory brainstem responses	roenne2012	★★☆	★★☆	★★★
Signal detection models				
Monaural masking	dau1997preproc	★★★	★★★	☆☆☆
Binaural signal detection	breebaart2001preproc	★★★	★★★	☆☆☆
Spatial models				
Lateralization, cross-correlation	lindemann1986	★★★	★★★	★★☆
Concurrent-speakers lateral dir.	dietz2011	★★★	★★★	★★★
Lateralization, supervised training	may2013	★☆☆	★☆☆	☆☆☆
Binaural activity map	takanen2013	★★★	★☆☆	☆☆☆
Median-plane localization	langendijk2002	★★☆	★★★	★★★
Sagittal-plane localization	baumgartner2013	★★★	★★★	★★★
Distance perception	georganti2013	★☆☆	★☆☆	☆☆☆
Speech perception models				
Speech intelligibility in noise	joergensen2011	★☆☆	★☆☆	★★★
Spatial unmasking for speech	jelfs2011	★★☆	★★★	★★☆