

SMT error analysis and mapping to syntactic, semantic and structural fixes

Nora Aranberri

IXA Group
University of the Basque Country

Index

- 1 Introduction
- 2 Error classification schemes
- 3 Our approach
- 4 The SMT systems
- 5 Error analysis results
- 6 Fixing possibilities with SSS
- 7 Conclusions

Introduction

Error classification schemes

Our approach

The SMT systems

Error analysis results

Fixing possibilities with SSS

Conclusions

Error analysis for SMT

- Does error analysis make sense for SMT?

Error analysis for SMT

- Does error analysis make sense for SMT?
- Which aspects should it cover?

Index

- 1 Introduction
- 2 Error classification schemes**
- 3 Our approach
- 4 The SMT systems
- 5 Error analysis results
- 6 Fixing possibilities with SSS
- 7 Conclusions

Dynamic Quality Framework - TAUS

Typology Errors:
Count and categorize errors per segment

<input type="text" value="0"/> Country standards	<input type="text" value="0"/> Style	<input type="text" value="0"/> Terminology	<input type="text" value="0"/> Language	<input type="text" value="0"/> Accuracy
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- Dimensions: attributes, grammatical and localization issues

Dynamic Quality Framework - TAUS

Typology Errors:
Count and categorize errors per segment

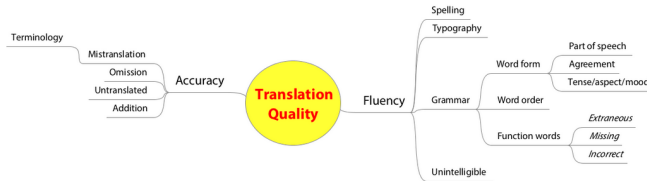
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- Dimensions: attributes, grammatical and localization issues

Disadvantages

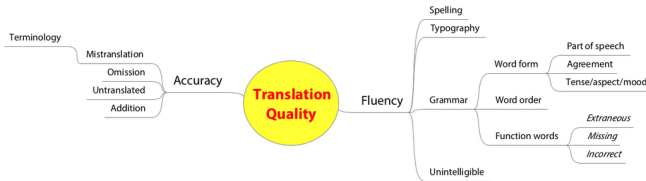
- High-level annotation only
- Mixed dimensions

Multidimensional Quality Metric - QTLaunchPad



- MQM Core: a hierarchy of 22 issues
- Dimensions: quality attributes, grammar/linguistic and edit-types
 - Top level dichotomy: accuracy vs fluency
 - Lower-levels: grammatical/linguistic and edit-type errors

Multidimensional Quality Metric - QTLaunchPad

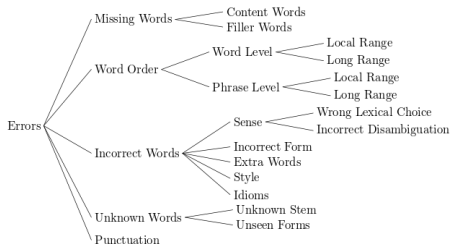


- MQM Core: a hierarchy of 22 issues
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Disadvantages

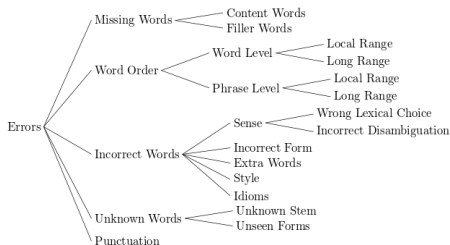
- Mixed dimensions
- Issues often too broad to identify SSS solutions

SMT-oriented classification - Vilar et al. 2006



- Dimensions: edit-types and linguistic issues
 - Top level: edit-types
 - Lower-levels: edit-types, spans and grammatical issues

SMT-oriented classification - Vilar et al. 2006



- Dimensions: edit-types and linguistic issues
 - Top level: edit-types
 - Lower-levels: edit-types, spans and grammatical issues

Disadvantages

- Not informative enough linguistically for SSS solutions

Index

- 1 Introduction
- 2 Error classification schemes
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- 5 Error analysis results
- 6 Fixing possibilities with SSS
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Proposed bidimensional error scheme

dynamic, extensible bidimensional scheme

Top-level category	Subclasses	Incorrect	Missing	Additional
Lexis				
Morphosyntax				
Verbs				
Order				
Punctuation				
Untranslated				

- Complementary dimensions: linguistic issues and edit-types
 - Six top linguistic categories
 - Dynamic extensible hierarchy
 - Three edit-type categories

Proposed bidimensional error scheme

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Top-level category	Subclasses	Incorrect	Missing	Additional
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To be considered

- Further dimensions (e.g. severity)

Index

- 1 Introduction
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Description of the SMT systems

English-Spanish SMT

- Standard phrase-based Moses system
- Training data:
 - Bilingual: europarl, UN corpus, News Commentary and Common Crawl (~335M words)
 - Monolingual: Spanish part of europarl, News Commentary and Common Crawl (~60M words)
- In-domain tuning data: 1,000 QA interactions
- BLEU score (in-domain): 45.86

English-Basque SMT

- Phrase-based Moses system
- Alignment at lemma-level
- Training data:
 - Bilingual: academic books, software manuals and UI strings, web-crawled data (~13.5M words)
 - Monolingual: Basque part of the above + administrative text (~21M words)
- In-domain tuning data: 1,000 QA interactions
- BLEU score: 20.24

Index

- 1 Introduction
- 2 Error classification schemes
- 3 Our approach
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Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors

example of a lexical error

Click **run** where it says vulnerabilidades.
Pulse **correr** donde dice vulnerabilidades.

Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors
- Morphosyntax: 29%

example of a morphosyntactic error

Yes, you can share files and folders with one or more users **on** MEO Cloud.
Sí, puede compartir archivos y carpetas con uno o más usuarios **sobre** MEO Cloud.

Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors
- Morphosyntax: 29%
- Verbs: 18%

example of a verb error

Connect your computer to the ZON HUB via Ethernet cable.

Conectar su ordenador a la HUB af a través de cable Ethernet. (infinitive to connect)

Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors
- Morphosyntax: 29%
- Verbs: 18%
- Order: 11%

example of an ordering error

Tap Import to copy your **Android Browser Favourites**.
Toca Importar para copiar su **navegador de Android favoritos**.

Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors
- Morphosyntax: 29%
- Verbs: 18%
- Order: 11%
- Punctuation: 6%

example of a punctuation error

If I buy a computer abroad, will it work in Portugal
Si compro un ordenador en el extranjero, funcionará en Portugal? (missing ').

Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors
- Morphosyntax: 29%
- Verbs: 18%
- Order: 11%
- Punctuation: 6%
- Untranslated: 5%

example of an untranslated unit

Then click on the yellow disc with a green tick.

Then haga clic en el disco de color amarillo con una marca verde.

Error analysis for the English-Spanish pair

137 sentences evaluated with a total of 169 errors.

- Lexis: 31% of the total errors
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Error analysis for the English-Basque pair

140 sentences evaluated with a total of 393 errors.

- Lexis: 23% of the total errors

example of a lexical error

Go to WhatsApp > 'Menu Button' > 'Status'.
Joan menu botoia WhatsApp > " " > " egoera ".

Error analysis for the English-Basque pair

140 sentences evaluated with a total of 393 errors.

- Lexis: 23% of the total errors
- Morphosyntax: 39%

example of a morphosyntactic error

simply by dragging the profile of the person concerned **to** the various circles.
besterik gabe, arrastatu pertsonaren profila hainbat nahia zirkulu.

Error analysis for the English-Basque pair

140 sentences evaluated with a total of 393 errors.

- Lexis: 23% of the total errors
- Morphosyntax: 39%
- Verbs: 18%

example of a verb error

Choose a standard status or personalize one.
Egoera estandar bat edo pertsonalizatu bat.

Error analysis for the English-Basque pair

140 sentences evaluated with a total of 393 errors.

- Lexis: 23% of the total errors
- Morphosyntax: 39%
- Verbs: 18%
- Order: 14%

example of an ordering error

You can use the red app **iPP Podcast Player** you find on Google Play.

Aplikazioa erabil dezakezu IPP podcast Player aurkitu duzu Google erreproduzitu.

Error analysis for the English-Basque pair

140 sentences evaluated with a total of 393 errors.

- Lexis: 23% of the total errors
- Morphosyntax: 39%
- Verbs: 18%
- Order: 14%
- Punctuation: 4%

example of a punctuation error

How can I change the language to of Mega to Portuguese?
Nola aldatu hizkuntza of Mega, portugesa?

Error analysis for the English-Basque pair

140 sentences evaluated with a total of 393 errors.

- Lexis: 23% of the total errors
- Morphosyntax: 39%
- Verbs: 18%
- Order: 14%
- Punctuation: 4%
- Untranslated: 1%

example of an untranslated unit

How much space do I have for free on Mega?
Zenbat leku ditut doan on Mega?

Error analysis for the English-Basque pair

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- Untranslated: 1%

Index

- 1 Introduction
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Fixing possibilities with syntax, semantics and structure

Main sources for errors

- use-scenario-specific features
 - Q&A chat scenario in the information technology domain
- language pair-specific features

Fixing possibilities with syntax, semantics and structure

IT names not identified

(CR)NER

Fixing possibilities with syntax, semantics and structure

IT names not identified	(CR)NER
Uls not identified	NER

Fixing possibilities with syntax, semantics and structure

IT names not identified	(CR)NER
UIs not identified	NER
domain-specific terminology	WSD

Fixing possibilities with syntax, semantics and structure

IT names not identified	(CR)NER
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Basque postpositions	predicate-argument structures and semantic roles

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incorrectly ordered phrases	predicate-argument structures and semantic roles

Fixing possibilities with syntax, semantics and structure

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split phrases	syntax

Fixing possibilities with syntax, semantics and structure

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incorrectly ordered phrases	predicate-argument structures and semantic roles
split phrases	syntax
incorrect phrase-internal order	syntax

Fixing possibilities with syntax, semantics and structure

IT names not identified	(CR)NER
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domain-specific terminology	WSD
Basque postpositions	predicate-argument structures and semantic roles
incorrectly ordered phrases	predicate-argument structures and semantic roles
split phrases	syntax
incorrect phrase-internal order	syntax
incorrectly generated verb phrases	

Index

- 1 Introduction
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Conclusions

- proposed a bidimensional error classification
 - dynamic, extensible linguistically-informed dimension
 - edit-types
- evaluated English-Spanish and English-Basque SMT systems
 - domain-related issues:
 - terminology and UI strings
 - language-pair-specific issues:
 - English prepositions and subordinate markers for Basque
 - verb phrase generation
 - ordering at different levels
- revealed potential of SSS to solve errors

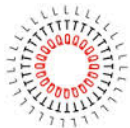
Thanks!
nora.aranberri@ehu.eus

eman ta zabal zazu



Universidad
del País Vasco

Euskal Herriko
Unibertsitatea



qt leap