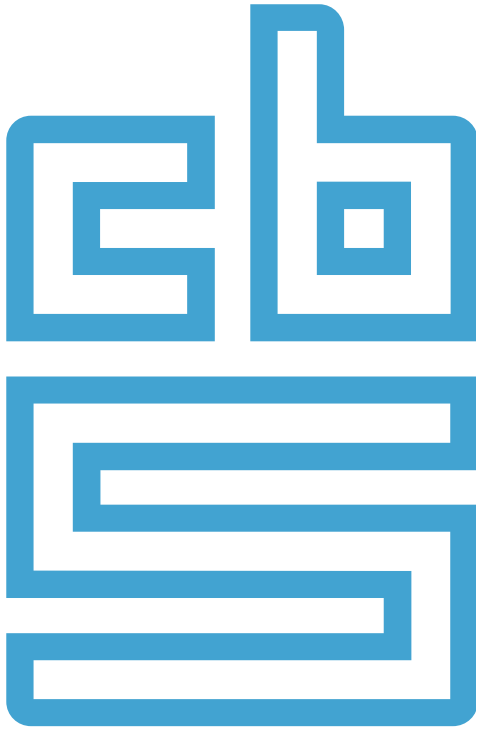


Machine Learning opportunities for a standardized Reference Chart of Accounts

Supervised Learning classification at Statistics Netherlands

Dominik Blatt and Ger Snijkers

2017-02-01

Introduction

Statistics Netherlands

Facts that matter

Financial data → statistics on Dutch businesses

Data collection / Center for Big Data Statistics

Machine Learning can accelerate the transition to a standardized classification system of financial information

Financial reporting developments
Automated mapping of ledgers to RGS
Transferring information back

Financial reporting developments

SBR-RGS

Reference Chart of Accounts (RGS)

- Integration and automation
- Jointly developed

Standard Business Reporting (SBR)

- Dutch government initiative

XBRL

Gaining international momentum

SBR-RGS and Statistics Netherlands

Reduce response burden

Questionnaires

No legal obligation to use RGS

SBR-RGS channel opened for quarterly questionnaire

Limited success so far

Benefit and cost

SBR-RGS channel for larger questionnaires

Transferring information back

Automated mapping of ledgers to RGS

Stable taxonomy, or automatically adjusted

Cooperation with accountants and software developers

Automated mapping of ledgers to RGS

ML classification

Predict RGS concepts based on features in description of (company-specific) ledgers

Purpose

- Reduce the workload of companies
- Translation
- Transition

Hierarchical classification

Branch Convolutional Neural Network

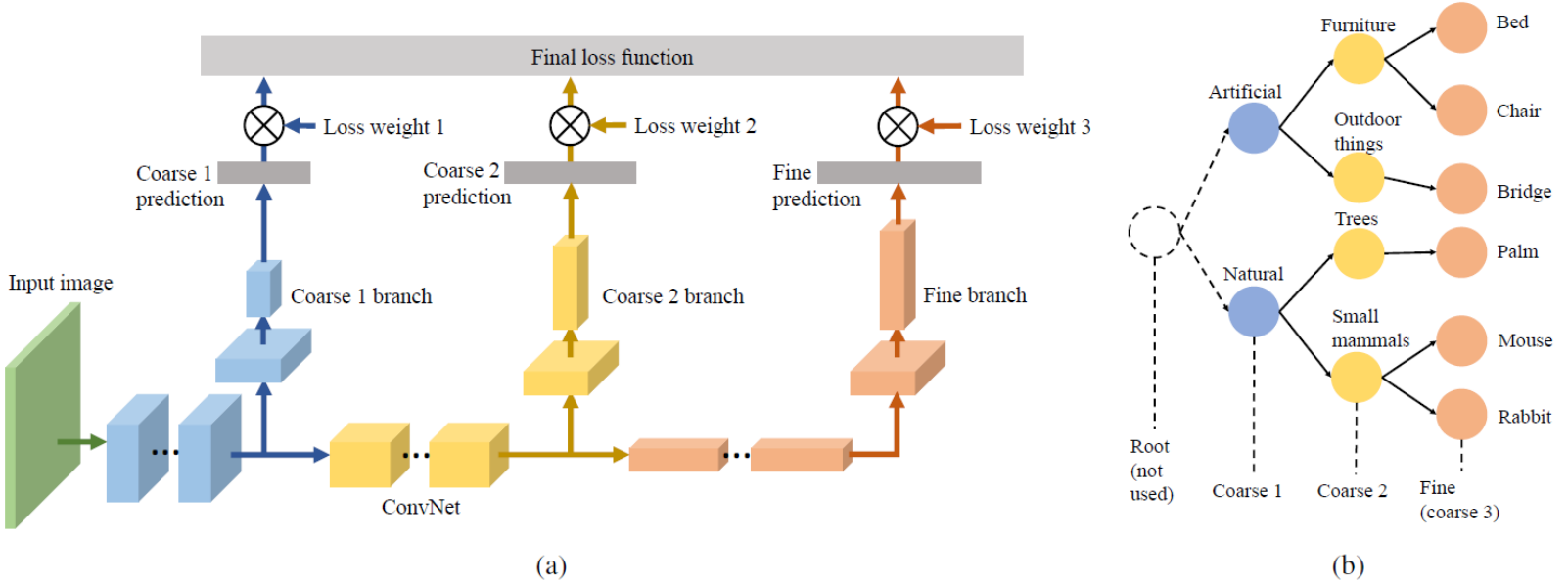


Figure 1: (a) Architecture of Branch Convolutional Neural Network (B-CNN). The network at the bottom can be an arbitrary ConvNet. There can be multiple branch networks and each of them outputs a coarse prediction. The final loss function is a weighted summation of all coarse losses. (b) A sample hierarchical label tree where classes are taken from CIFAR-100 dataset.

Taken from [1] Zhu & Bain (2017)

Challenges and opportunities

Training data

Cooperation with accountancies

Unusual hierarchy classification

Accuracy and aggregation

Transferring information back

ML classification

Based on financial data composition, predict

- probability of solvency
- revenue increase
- … ?

Idea and purpose

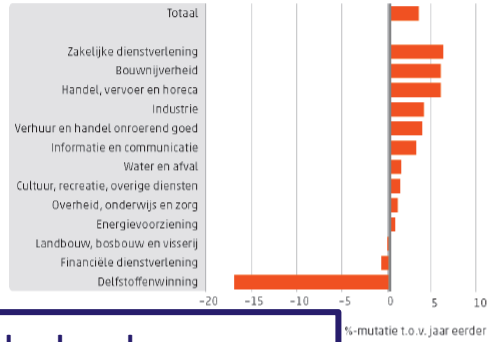
- Feedback
- Thank You
- Benchmarking

Factsheet SBR
2e kwartaal 2017

2017 Q2

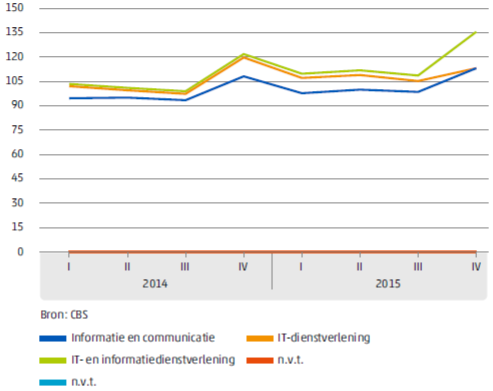
Added value per sector, yearly change

Toegevoegde waarde naar bedrijfstak, tweede kwartaal 2017



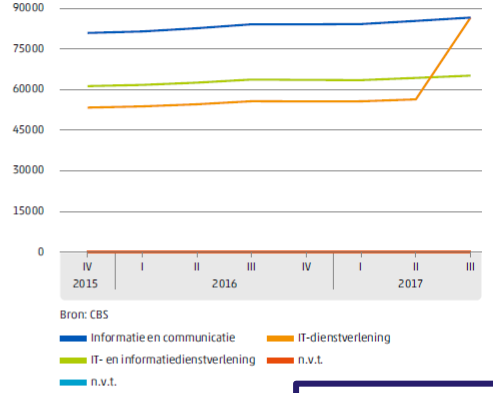
Revenue

Omzet index kwartaal



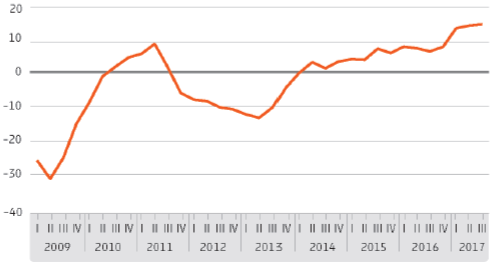
Number of companies

Aantal bedrijven kwartaal



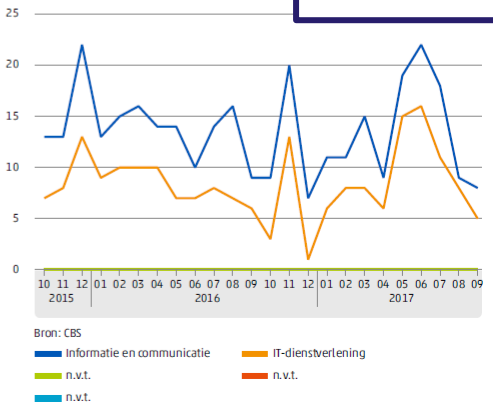
Business outlook

Ondernemersvertrouwen Nederland, totaal niet-financieel bedrijfsleven



Insolvencies

Aantal faillissementen per maand



Insolvencies

850 faillisementen in tweede kwartaal 2017

Challenges and opportunities

Facts that matter

Specific neural network / classification design

Confidence and footnotes

Transfer channel

Conclusions

Conclusions

XBRL technical standard of RGS-SBR

Machine Learning

- Benefit increase: Additional information
- Cost decrease: RGS transition or translation

Trial and Error

Feedback from companies

Partnerships

References

[1] Zhu, X., & Bain, M. (2017). B-CNN: Branch Convolutional Neural Network for Hierarchical Classification. *arXiv preprint arXiv:1709.09890*.

[2] Buiten, G., Snijkers, G., Saraiva, P., Erikson, J., Erikson, A.-G., & Born, A. (2018). Business Data Collection: toward Electronic Data Interchange. Experiences in Portugal, Canada, Sweden and the Netherlands with EDI. *Journal of Official Statistics, forthcoming*.

Questions, remarks, or suggestions?

LinkRole	urn:cbs:linkrole:ss-indirect-taxes-excluding-vat					
Definition	Belastingen op verkochte goederen en diensten uitgezonderd BTW					
prefix	name	depth	order	priority	parent	systemid
cbs-abstr	IndirectTaxesExcludingVATTitle	0				
cbs-i	IndirectTaxesExcludingVAT	1	1.0	0	cbs-abstr:IndirectTaxesExcludingVATTitle	cbs-ss-indirect-taxes-excluding
cbs-i	IndirectTaxesExcludingVATDuties	2	1.0	0	cbs-i:IndirectTaxesExcludingVAT	cbs-ss-indirect-taxes-excluding
cbs-i	IndirectTaxesExcludingVATCarsAndMotorcycles	2	2.0	0	cbs-i:IndirectTaxesExcludingVAT	cbs-ss-indirect-taxes-excluding
cbs-i	IndirectTaxesExcludingVATInsuranceTax	2	3.0	0	cbs-i:IndirectTaxesExcludingVAT	cbs-ss-indirect-taxes-excluding
cbs-i	IndirectTaxesExcludingVATOtherProductRelatedTaxes	2	4.0	0	cbs-i:IndirectTaxesExcludingVAT	cbs-ss-indirect-taxes-excluding
cbs-i	IndirectTaxesExcludingVATNotProductRelatedTaxes	2	5.0	0	cbs-i:IndirectTaxesExcludingVAT	cbs-ss-indirect-taxes-excluding

LinkRole	urn:cbs:linkrole:ss-net-revenue					
Definition	Netto-omzet					
prefix	name	depth	order	priority	parent	systemid
cbs-abstr	NetRevenueTitle	0				
venj-bw2-i	NetRevenue	1	1.0	0	cbs-abstr:NetRevenueTitle	cbs-ss-net-revenue-pre.xml
cbs-i	NetRevenueProducedGoods	2	1.0	0	venj-bw2-i:NetRevenue	cbs-ss-net-revenue-pre.xml
cbs-i	NetRevenueProducedGoodsGeneralTariff	3	1.0	0	cbs-i:NetRevenueProducedGoods	cbs-ss-net-revenue-pre.xml
cbs-i	NetRevenueProducedGoodsReducedTariff	3	2.0	0	cbs-i:NetRevenueProducedGoods	cbs-ss-net-revenue-pre.xml
cbs-i	NetRevenueProducedGoodsOtherRates	3	3.0	0	cbs-i:NetRevenueProducedGoods	cbs-ss-net-revenue-pre.xml
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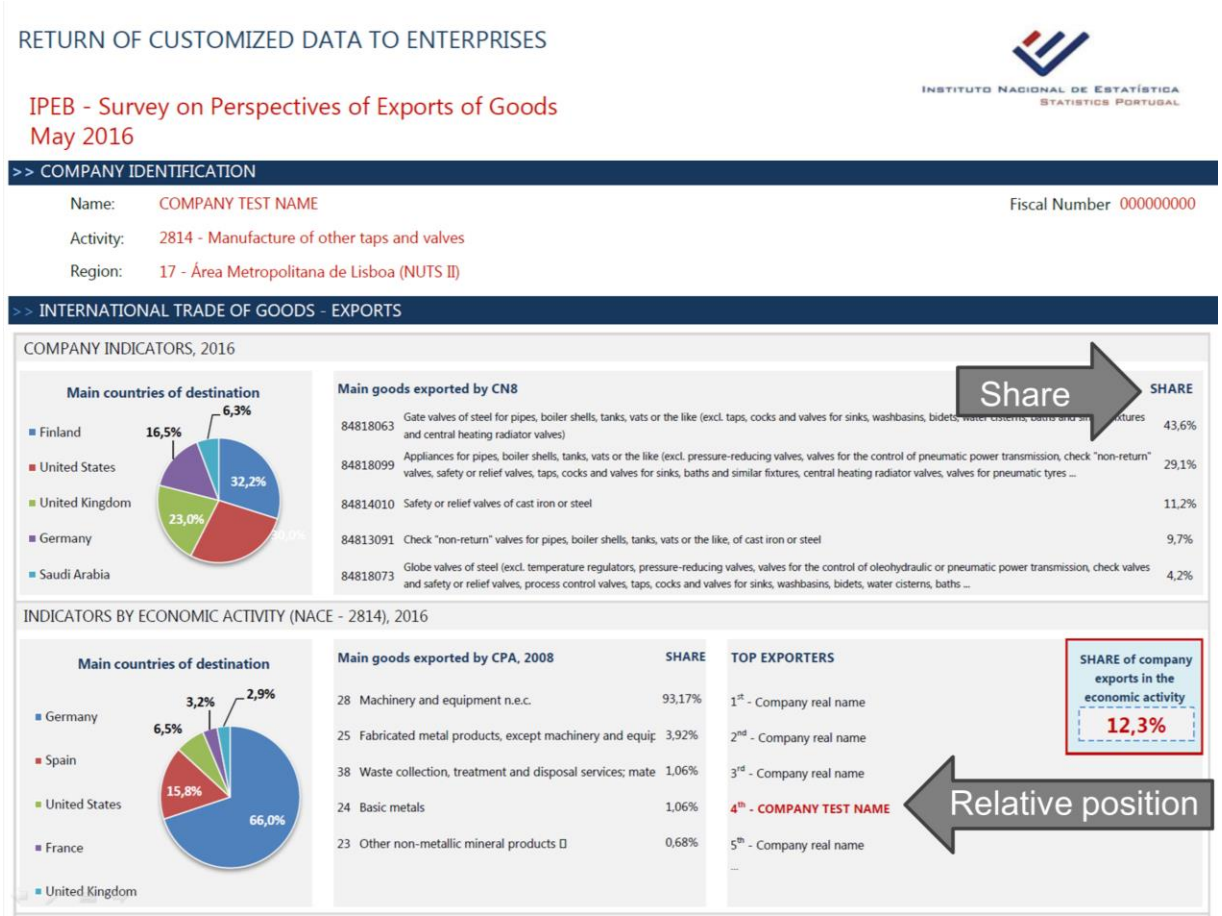

Taken from [2] Buiten et al. (2018)