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Classification of the Purchasing Power Parities Nomenclature

22/5 2025

AIML4OS WP10 cluster 3 w. Austria
Thank you ---- and ----!

Outline

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1. Case: What Official Statistics process are we talking about?

2. Highlights from the project history
   - What has been done?
   - Results

3. Lessons and Perspectives
   - Suggestions (are welcome!!!)
   - Questions

4. What is hierarchy and is it useful?

Raise hands or make a noise/comment

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- Who of you have heard or know a little about
  - COICOP?
  - Hierarchical classification?

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Case

Case: Purchasing Power Parities (PPP)

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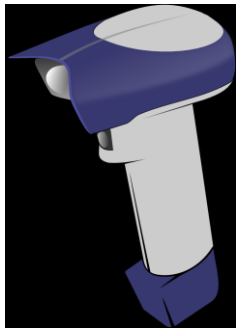
- To ensure that Eurostat enables international comparisons
  a) in real values
  b) of price levels

- The business process of Official Statistics:

  Eurostat ← PPP-calculations ← PPP-classification ← data…

Case: Classify scanner data (1)

- Major retailers provide to Statistics Denmark the ”scanner-data”



Placeholder – data removed

Case: Classify scanner data (2)

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- Eurostat's triannual .XML
  - Defines a hierarchical product taxonomy
  - PPP = COICOP + 3 levels

A.01.1.7.5.01.bb Potato crisps, BL (UID: 7428)
3

Brand:	---
Reference Quantity:	**200 g**
Minimum quantity:	150
Maximum quantity:	350
Exclude:	multipack; fried in olive oil

SPECIFY: **Label |**

A.01.1.7.5.01.ba Potato crisps, WKB (UID: 2101)
2

Brand:	**Well Known**
Reference Quantity:	**200 g**
Included in ICP global list:	yes
Minimum quantity:	130
Maximum quantity:	300
Type:	salted or flavoured
Exclude:	PRINGLES; multipack; exotic flavours; fried in olive oil

SPECIFY: **Brand |**

Case: Classify scanner data (3)

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- Classification currently done manually
  - ”The boys” look up information online to discriminate classes
  - Provides a dataset of scanner-data with the classes i.e. supervised

Case: Classify scanner data (4)

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- Analytical situation
  - ~400 theoretical classes at level 1.2.3.4.5.6.7
  - ~15.000 skewed/unbalanced observations of the classes
  - *Is it possible to gain leverage over the classification problem by use of the class hierarchy?*

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Project History

Highlights from the Project History

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- 2010-20: Statistics DK increasingly systematizes scanner data as retailers returns more of it

- 2022: --------- develops the project now discussed in AIML4OS
  - Experimenting with text prep. & bag of words; then different embeddings
  - PyTorch NN BERT finetuning gives rise to ~70% classification accuracy (at L2), but…
  - Accuracy varies substantially by the frequency of the class observations

- 2024, second half: An intern reviews --------- work

- 2025, spring: ------ are given a go at the project
  - Understand and get some of Peter's code to run
  - FastText gives rise to ~90% classification accuracy, but…

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Lessons and Perspectives

Lessons We Believe We Learned

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- Perhaps more about project and code organization than ML/AI
  - Describe the business process of Official Statistics
  - Make realistic assumptions about what data will be available → modelling
  - Make it clear to readers of the code what is a preliminary experiment, what is a final solution, etc.

Perspectives (1)

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- Will _____ wreck havoc with learned classifications?
  - Items not yet observed
    - Low accuracy demands manual labor
  - Triannual PPP.XML updates
    - make accurate predictions at t_0 incorrect at t_1
- Model differences in the .XML?

Perspectives (2)

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- Estimate distance/similarity, not classification probability?
  - Few-shot learning or Siamese NN
  - .XML as ”support set”
  - Scanner data as ”query set”
  - Positive and negative pairs and perhaps even an anchor
    - Negative pairs can be selected using information about the hierarchical structure

➔ *Is it possible to gain leverage over the ~~classification~~ comparison problem by use of the class hierarchy definitions?*

Perspectives (3)

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- Predict longer product descriptions from shorter ones?

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Suggestions and Questions

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Hiercarchical classes

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Screenshot of some results has been removed

What is Hierarchy?

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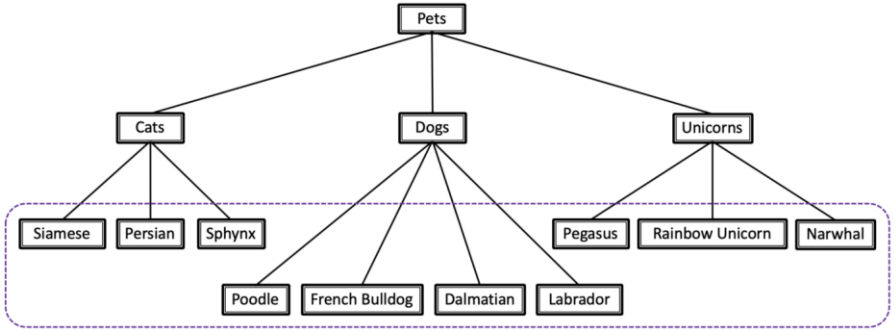
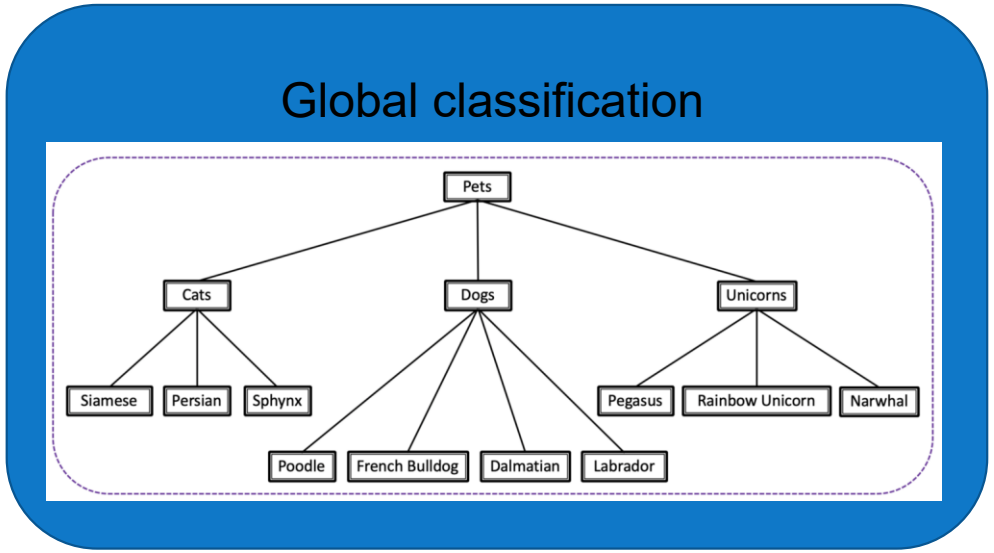
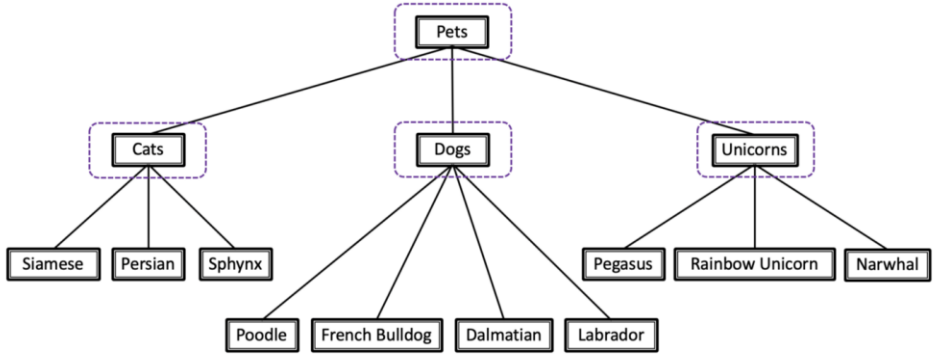
Flat classification



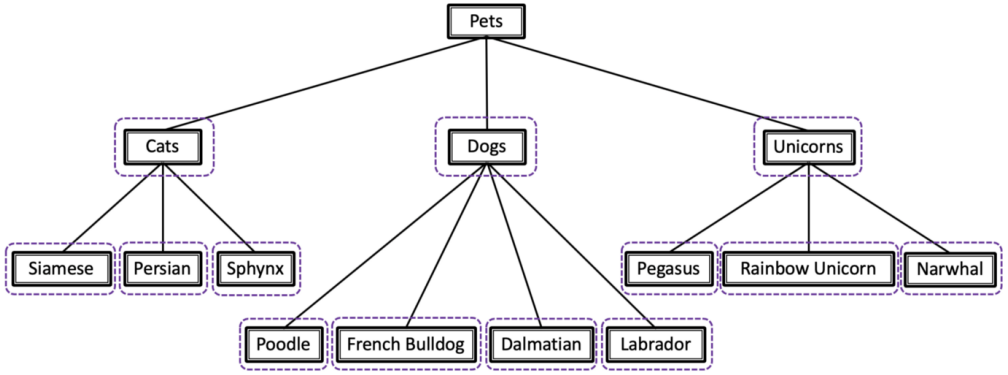
Global classification



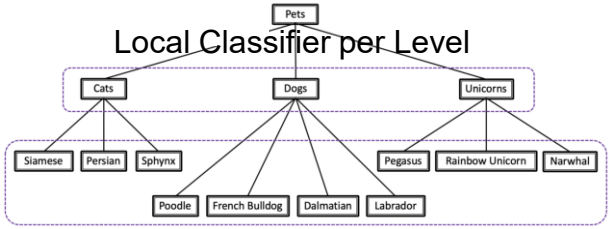
Local Classifier per Parrent Node



Local Classifier per Node



Local Classifier per Level



Needn’t Hierarchy?

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- Experience with data at DE-stasis and DST suggests not