Pattern Recognition and Human Language Technology Research Center

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Outline

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People

- Director: Joan Andreu Sánchez-Peiró.
- 30 members[1].
- Academic degrees:
  - ▶ 15 PhD.
  - ▶ 1 project manager.
  - ▶ 14 PhD students.
- Academic positions:
  - ▶ 10 professors and assistants (DSIC-UPV).
  - ▶ 9 research contracts.
  - ▶ 11 fellowships.

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[1]`https://www.prhlt.upv.es/about-us`.

Computing infrastructure

- GPUs:
  - ▶ 19 x NVIDIA GeForce GTX 1080 (8GB).
  - ▶ 28 x NVIDIA GeForce GTX 20XX (8GB).
  - ▶ 4 x NVIDIA GeForce RTX 30XX (12 & 24 GB).
  - ▶ 1 x NVIDIA Quadro RTX 4000 (8GB).
  - ▶ 2 x NVIDIA Titan XP (12 GB).
  - ▶ 5 x NVIDIA GeForce RTX 4090 (24GB).
- 3 x NAS (116TB).

Main research areas

Fundamental research

- Statistics.
- Machine learning.
- Pattern recognition.
- Multimodal interaction.
- Big data analytics.

Applied research

- **Language translation**.
- Natural language processing.
- Speech processing.
- Handwritten text recognition.
- Stochastic parsing.
- Biometrics.
- Image & video description.
- Computer vision.

Machine translation

Main topics

- Statistical machine translation.

- Neural machine translation.

- Interactive machine translation.

- Pre-trained multilingual language models.

- Modernizing historical documents.

- Online learning for machine translation.

- Image description (MT approach).

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https://www.prhlt.upv.es/language-translation-showcase/
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Machine translation

Projects

- Research projects:
  - ▶ **EuTrans**. EC, FP4.
  - ▶ **TT2**. EC, FP5.
  - ▶ **MIPRCV**. CONSOLIDER INGENIO-2010.
  - ▶ **CasMaCat**. EC, FP7.
  - ▶ **DeepHealth**. H2020. (No machine translation.)

- Challenges:
  - ▶ Covid-19 Multilingual Information Access (MLIA) initiative.
  - ▶ WMT22 - Shared Task: Word-Level AutoCompletion.

- Technology transfer:
  - ▶ CelerPost and Pangematic.
  - ▶ ITILang (Patent).
  - ▶ Sciling (Startup).

Machine translation

Demos

- Interactive Neural Machine Translation:
  `https://demosmt.prhlt.upv.es/inmt/`.

- Machine Translation Applications to Historical Documents:
  `https://demosmt.prhlt.upv.es/mthd/`.

- Interactive Neural Multimodal Captioning:
  `https://demosmt.prhlt.upv.es/inmc/`.
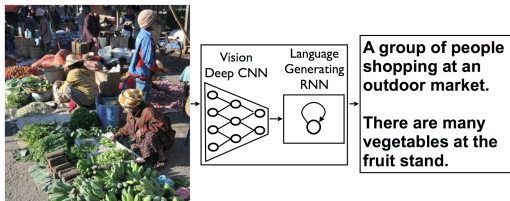
Handwriting transcription

Main topics:

- Transcription of ancient documents.
- Indexing & Search in large collections of handwriting images.

Related projects:

- **tranScriptorium**. EC, FP7. http://transcriptorium.eu/.
- **READ**. H2020 e-infraestructure. https://read.transkribus.eu/.

https://www.prhlt.upv.es/htr-showcase

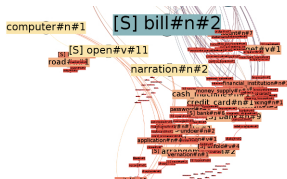# Applications of deep learning

Main topics:

- Fraud detection – DeepFraud.

- Energy consumption estimation – DeepEnergy.

- Biometric Image recognition – DeepFace.

- Unsupervised social community detection – DeepSocial.

Related projects:

- **DeepHealth**, **Selene** & **Fractal** (H2020).

- **Rebecca** (HE).
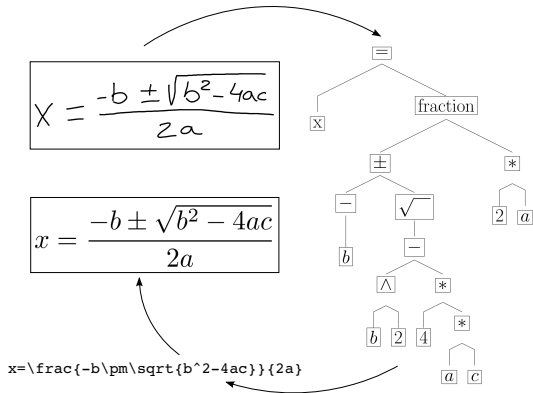
Natural language processing

Main topics:

- Fake news and conspiracy theories.
- Hate speech.
- Misogyny and stereotypes.
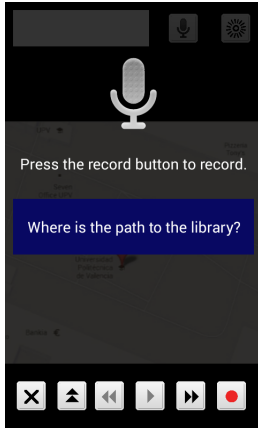- Irony and sarcasm.
- Author profiling.

Related projects:

- **XAI**-**DisInfodemics** – Spanish funds.
- **FairTransNLP** – Spanish funds.
- **MISMIS**-**PdC** – Spanish funds.
- **MARTINI** – EC CHIST-ERA.
- **Polarization and Hate Speech** – QATAR National Research Fund.

Mathematical expressions recognition

- Recognition of mathematical expressions.
- Interactive parsing.

Speech recognition

- Speech interaction with mobile devices.
- Multimodal speech processing.
- Sign language and lip-reading.

Results

- Scientific Publications[2]:
  - ▶ 75 PhD theses.
  - ▶ More than 200 papers in international scientific journals.
  - ▶ ∼500 papers in top tier conferences.
  - ▶ 300+ papers in books, workshops, and Spanish journals.

- Current technology transfer:
  - ▶ 11 agreements with companies.
  - ▶ 2 patents.
  - ▶ 1 startup (Sciling[3]).
  - ▶ 2 spin-off (Solver Machine Learning[4], tranSkriptorium[5]).

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[2]https://www.prhlt.upv.es/publications.
[3]https://sciling.com.
[4]https://iasolver.es.
[5]http://www.transkriptorium.com.

Outline

What can we bring?

- Large MT expertise (SMT and NMT).
  - ▶ Automatic.
  - ▶ Interactive.
- Challenges expertise:
  - ▶ Covid-19 Multilingual Information Access (MLIA) initiative.
  - ▶ WMT22 - Shared Task: Word-Level AutoCompletion.

Outline

What is our main interest in the project?

- Funding.
- Collaborations between different partners.
- Handwriting transcription?

Outline

Ideas for innovation

- Doubts regarding what there is already done.

- Post-editing data gathering for improving tools.
  - ▶ Expensive.
  - ▶ Probably still not enough.