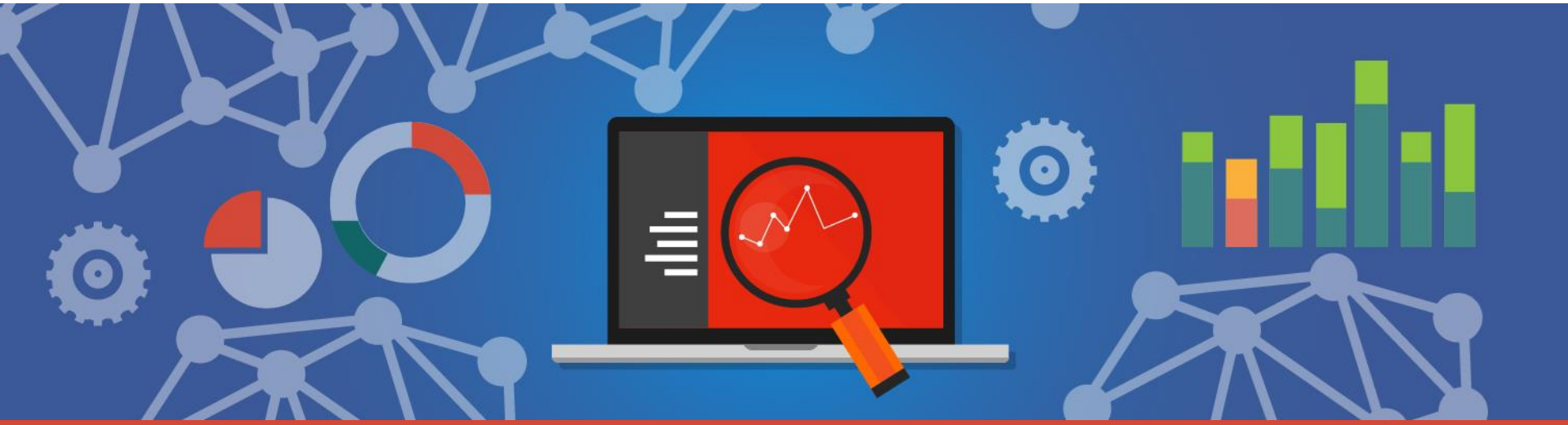
AFEL

Analytics for Everyday Learning



AFEL-REC

A Recommender System for Providing Learning Resource Recommendations in Social Learning Environments

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Outline

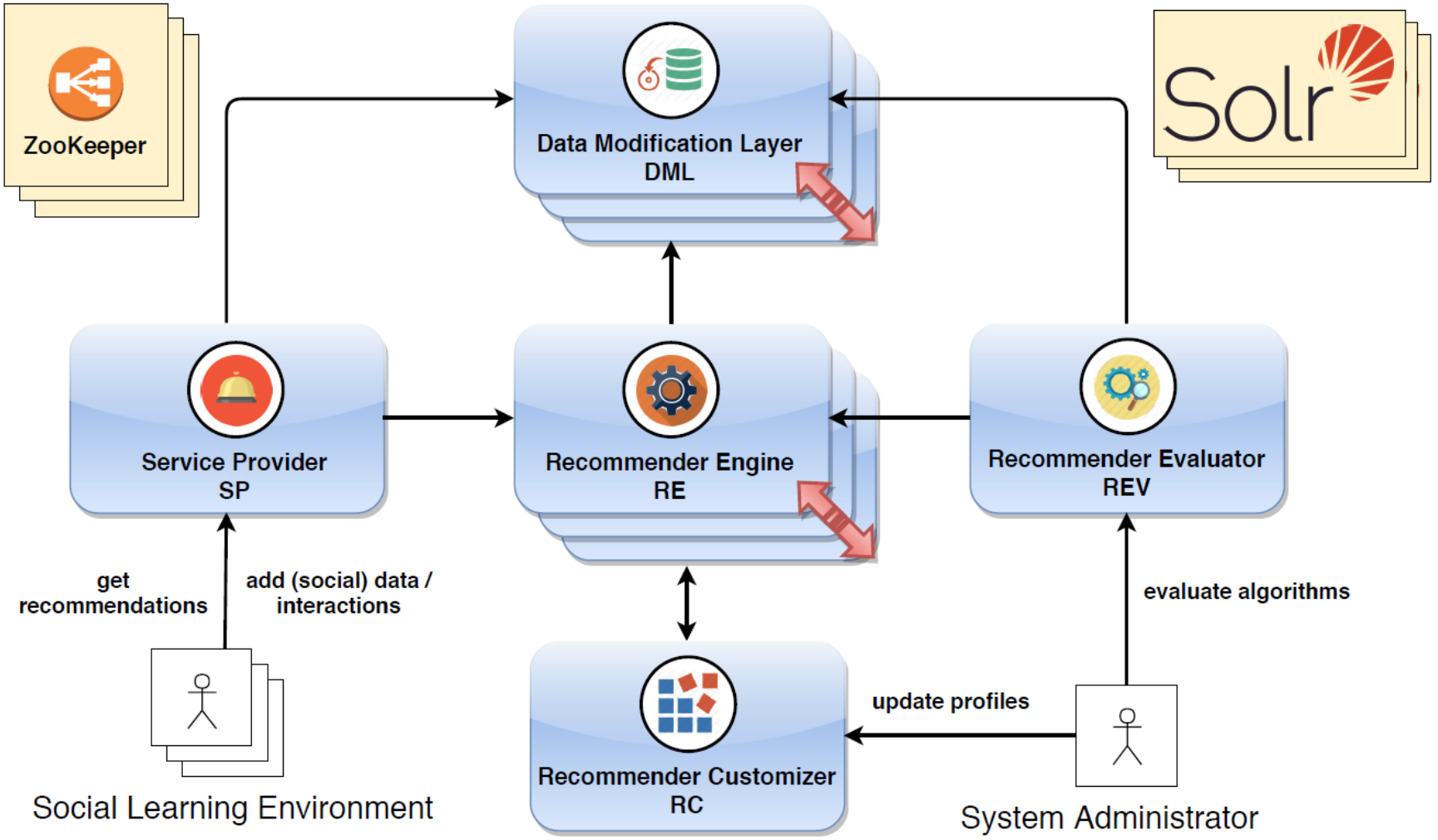
1. Introduction to the AFEL project & this paper
2. AFEL-REC system overview & examples
3. Evaluation setting & results
4. Conclusion & future work
5. Questions & discussion

Introduction: The AFEL Project & This Paper

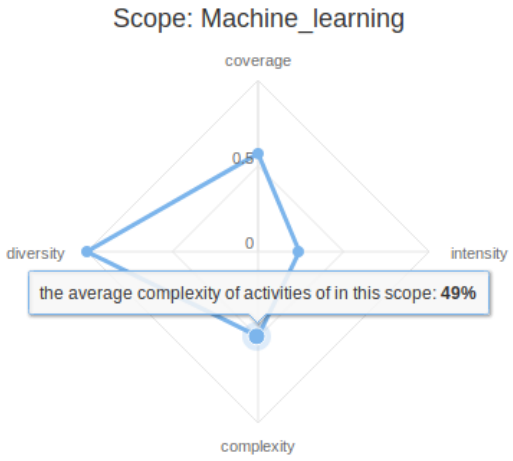
- **A**nalytics **F**or **E**veryday **L**earning
  - H2020-funded European project (2015 - 2018)
  - http://afel-project.eu/
- Goal
  - Develop tools to understand and support informal and collective learning in **online social learning environments**
  - **Evaluate** in Spanish social learning environment Didactalia
    - https://didactalia.net/
- Tools
  - Visual analytics, e.g., show learning progress via indicators
  - **Recommender systems**
- **The present work**
  - (i) contribute to sparse line of research about **recommender systems for social learning environments**
  - (ii) demonstrate the value of **social tags for resource recommendations**

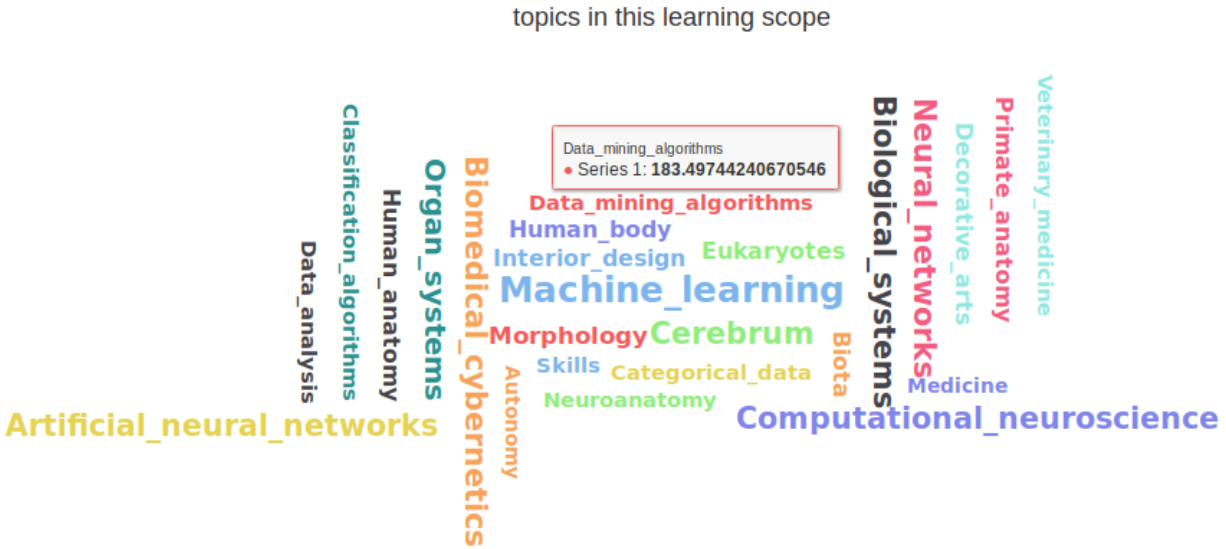
AFEL-REC: System Overview

- Based on **ScaR** framework: http://scar.know-center.tugraz.at/



AFEL-REC: Example (user profile)





AFEL-REC: Example (recommendations)

Recommendations

- machines minds and computers
- learning about numbers
- systems practice managing sustainability
- representing and manipulating data computers
- models and modelling
- the environmental impact teaching and learning
- modelling object oriented software introduction
- prices
- design
- brief guide neuroimaging

Latest activities in the scope

- https://www.google.com/search?q=knowledge discovery tugraz
  delete *move*
- http://www.google.com/search?q=knowledge discovery tugraz
  delete *move*

Evaluation: Setting

- Research Question
  - **How useful are social information in the form of tags for recommending learning resources?**

- Evaluate 3 Use Cases
  - UC1: **MostPopular (MP)** → Baseline
  - UC2: **Collaborative Filtering (CF_i)** → CF without social information
  - UC3: **Tag-based CF (CF_t)** → CF with social information (= our approach)
- Evaluation Protocol
  - For each user → **most recent 20%** of interactions for **testing**
  - Remaining interactions are used for **training**
- Evaluation Metrics
  - **Accuracy:** R@20, P@1, F1@10
  - **Ranking:** MRR@20, MAP@20, nDCG@20
  - **Coverage:** User coverage (C) → fraction of users with recommendations

Evaluation: Data

- Data from social learning environment **Didactalia**
  - **15 months:** 26th February 2017 – 28th May 2018
- **Tags** are currently the only social information used in the evaluation

- **Dataset statistics**

Number of interactions (i.e., clicks)	1,879,761
Number of users	1,274,858
Number of learning resources	35,346
Number of social tags	485,295
Average number of interactions per user	1.47
Average number of interactions per learning resource	53.18
Average number of tags per learning resource	13.73

Evaluation: Results

- **Average metrics over all users**

Approach	R@20	P@1	F1@10	MRR@20	MAP@20	nDCG@20	C
UC1: MP	.007	.002	.002	.002	.002	.003	**100%**
UC2: CF_i	.046	.022	.012	.025	.026	.032	40%
UC3: CF_t	**.070**	**.027**	**.016**	**.034**	**.035**	**.044**	53%

- **MP provides the highest coverage** (100%) → cold start users
- **CF_i provides 10 times higher accuracy than MP** but low coverage
- Our approach **CF_t provides best accuracy and ranking results** and **higher coverage than CF_i**

Conclusion: Discussion & Future Work

- Two main contributions
  - **We presented AFEL-REC** as a recommender system for social learning environments
  - Validated the usefullness of **social information in form of tags** for learning resources recommendations

  → **Answers RQ:** good trade-off between **accuracy, ranking and coverage**

- Limitations & Future Work
  - Currently tags are the only social information used

  → **Friendship connections, group memberships**, etc.
  - Indicators of learning scope are neglected

  → **Adaptive recommendations** (e.g., complexity, diversity)
  - Currently only offline evaluation

  → Evaluate the real user acceptance with **online evaluation study**
  - Research on novel recommendation approaches

  → See our paper in the **EYRE workshop @ CIKM (session 2)**

AFEL

Questions / suggestions ?

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Back-Up: AFEL-REC Use Cases

- **UC1:** Recommendation of **popular** resources in the environment
- **UC2:** Recommendation of resources of **like-minded users**
- **UC3:** Recommendation of resources based on **social information**
- **UC4:** Recommendation of **similar resources** of the user
- **UC5:** Recommendation of **alternatives** for a resource
- **UC6:** Recommendation of alternatives for a **user and resource**
- **UC7:** Adaptive recommendation of resources for a specific user and a specific **learning goal** (e.g., getting more complex or diverse)