Individual Research Project (ESR-2)
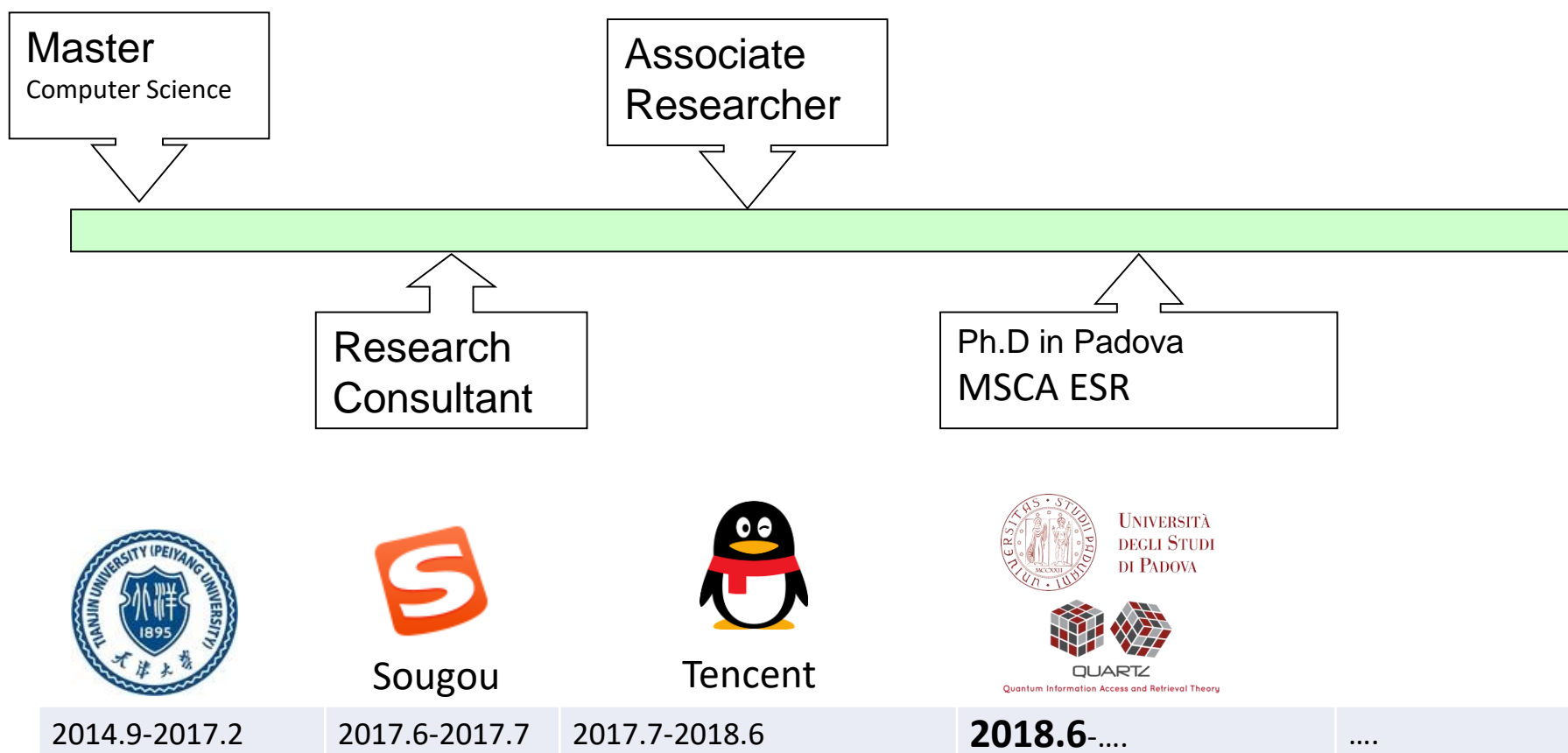
Benyou Wang

University of Padova

University of Padova, DD/MM/YYYY

Background/1

| 2014.9-2017.2 | 2017.6-2017.7 | 2017.7-2018.6 | **2018.6**-.... | .... |

Background/2

- Publish 15 peer-review papers, including
    - **Conferences**:
        - ✓ 1 **SIGIR** long paper
        - ✓ 2 **CIKM** long papers, short paper
        - ✓ 1 **AAAI** long paper
        - ✓ 2 **IJCAI** long papers
    - **Journals**:
        - ✓ 3 **Entropy** [JCR Q2] [1]
        - ✓ 1 **Information Science** [JCR Q1]
        - ✓ 1 **Theoretical Computer Science** [JCR Q1]

- Google Scholar Citation: 96 [2]

- New Chinese Boob (deep learning and recommendation system) will be published recently.

- SIGIR **Best Paper Award Honourable Mentions**

[1] https://scholar.google.com/citations?user=Jk4vJU8AAAAJ&hl=zh-CN
[2] Scimago Journal & Country Rank https://www.scimagojr.com/journalrank.php

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Training experiences

Training organized by Quartz

- **Winter school** [1] in Padova, Italy
- **Autumn School** in Cuttbus, Germany
- Presentation Training in Padova

Conferences founded by Quartz

- **ICML 2018** in July, Sweden
- **IJCAI 2018** in July, Sweden
- **ICTIR 2018** in Sep., China
- **CIKM 2018** in Oct., Italy

Coming Ph.D courses in the University of Padova

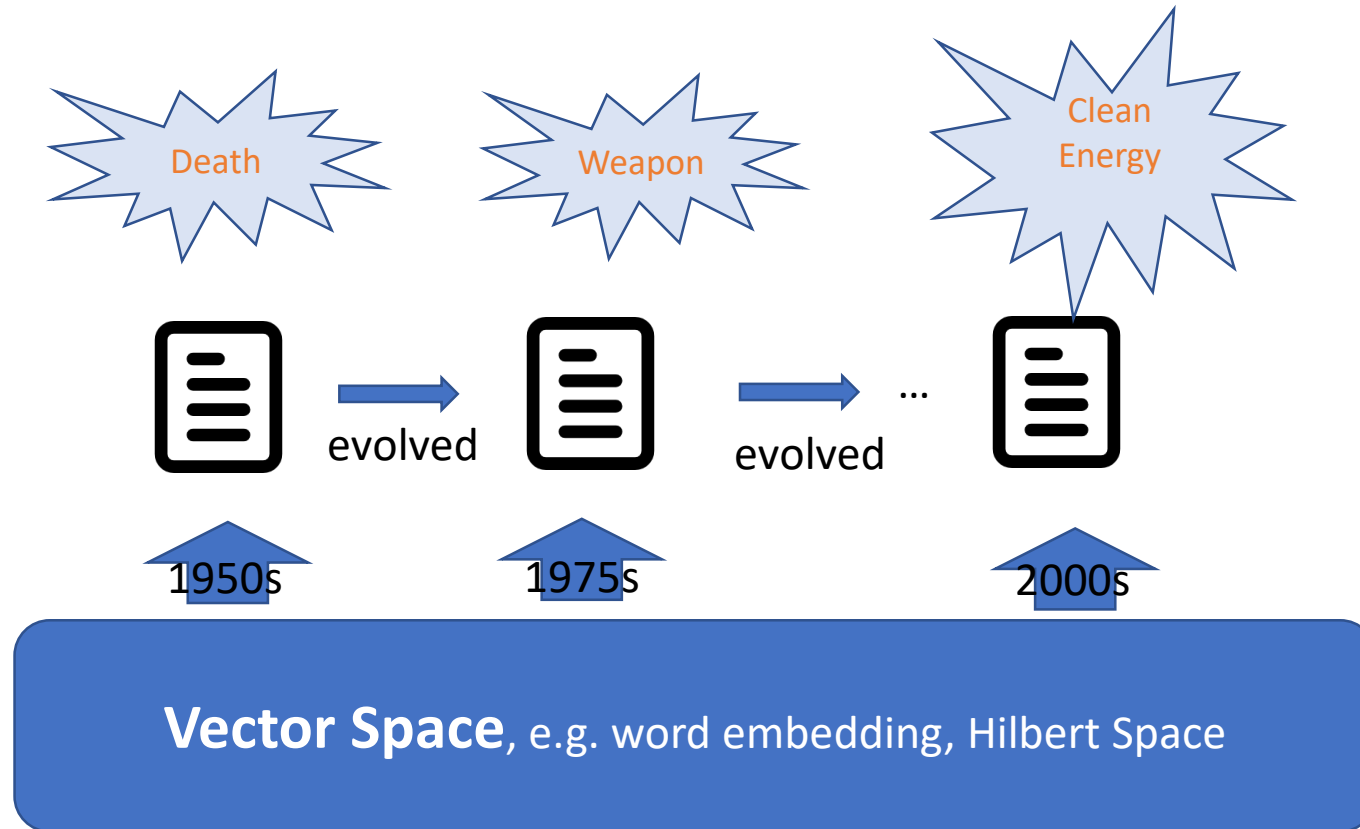[1] I was recruited in that moment although not yet hired, I signed the contract since June, 2018

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Research Proposal- ESR2

Dynamic content monitoring and exploration using **vector spaces**

Nuclear Technology

Death → Weapon → Clean Energy

evolved ... evolved

1950s 1975s 2000s

Vector Space, e.g. word embedding, Hilbert Space

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Research Plan

- **Vector Space Representation** for **static** text/document
  - Quantum-inspired representation for static text **[1,2,3,7,8,9]**
  - Some benchmarks and open-source project **[6]**
  - Overview of Vector Space approaches

- Extend it to **dynamic** content
  - Explore the dynamics of thematic issues e.g. recommendation **[4]** and language model
  - Implement it in dynamic corpora, e.g. newspaper, blogs, paper collections

[1] Peng Zhang, Zhan Su, Lipeng Zhang, **Benyou Wang** , Dawei Song. 2018. A Quantum Many-body Wave Function Inspired Language Modeling Approach. **CIKM 2018**
[2] Li Qiuchi, Uprety Sagar, **Wang Benyou** , Song Dawei Quantum-inspired Complex Word Embedding, ACL 2018 3rd Workshop on Representation Learning for NLP , **ACL 2018 RepL4NLP**
[3] Yazhou Zhang, Dawei Song, Peng Zhang, Panpan Wang, Jingfei Li, Xiang Li, **Benyou Wang** A Quantum-Inspired Multimodal Sentiment Analysis Framework. **Theoretical Computer Science** 2018.
[4] Wei Zhao, **Wang Benyou** , Jianbo Ye, Yongqiang Gao, Min Yang, Xiaojun Chen, PLASTIC: Prioritize Long and Short-term Information in Top-n Recommendation using Adversarial Training, **IJCAI 2018**
[5] Wei Zhao, **Wang Benyou** , Jianbo Ye, Min Yang, Zhou Zhao, Ruotian Luo, Yu Qiao A Multi-task Learning Approach for Image Captioning, **IJCAI 2018**
[6] **Wang Benyou**, Wang Li. et al. TextZoo, a New Benchmark for Reconsidering Text Classification , in Arxiv. 2018.
[7] Zhang Peng, Niu Jiabing, Su Zhan, **Wang Benyou** et al. End-to-End Quantum-like Language Models with Application to Question Answering. **AAAI 2018**
[8] **Wang Benyou ***, Li Q*, Prayag T, Massimo M, Sagar U, Dawei S. Quantum Probability Driven Framework for Sentence Modeling, WSDM 2018 **submission**.
[9] Li Q*, **Wang B***, CNM: An Interpretable Complex-valued Network for Matching, AAAI 2018 **submission**.

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Progress 1: End-2-end Language model
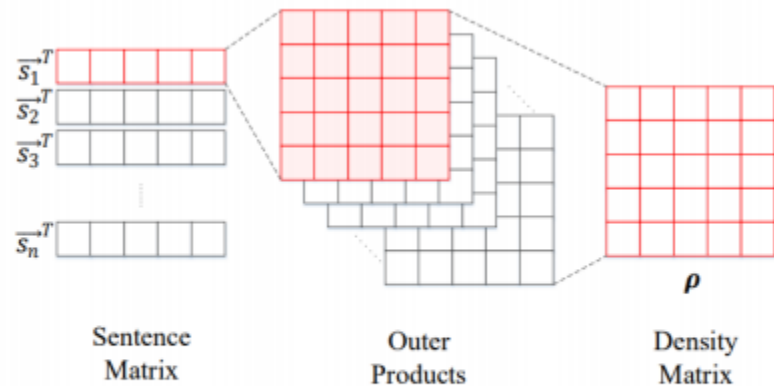
Matching with two matrices
- $tr(\rho_1 \rho_2)$
- CNN over $\rho_1 \rho_2$

Zhang Peng, Niu Jiabing, Su Zhan, **Wang Benyou** et al. End-to-End Quantum-like Language Models with Application to Question Answering. **AAAI 2018**

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Progress 2: Complex Word Embedding

Interference term for semantic composition

$$z^* = z_1 + z_2 = r_1 e^{i\theta_1} + r_2 e^{i\theta_2}$$

$$= \sqrt{r_1^2 + r_2^2 + 2r_1r_2 \cos(\theta_2 - \theta_1)} \times e^{i \arctan\left(\frac{r_1 \sin(\theta_1) + r_2 \sin(\theta_2)}{r_1 \cos(\theta_1) + r_2 \cos(\theta_2)}\right)}$$

Li Qiuchi, Uprety Sagar, **Wang Benyou** , Song Dawei Quantum-inspired Complex Word Embedding, ACL 2018 3rd Workshop on Representation Learning for NLP , **ACL 2018 RepL4NLP**
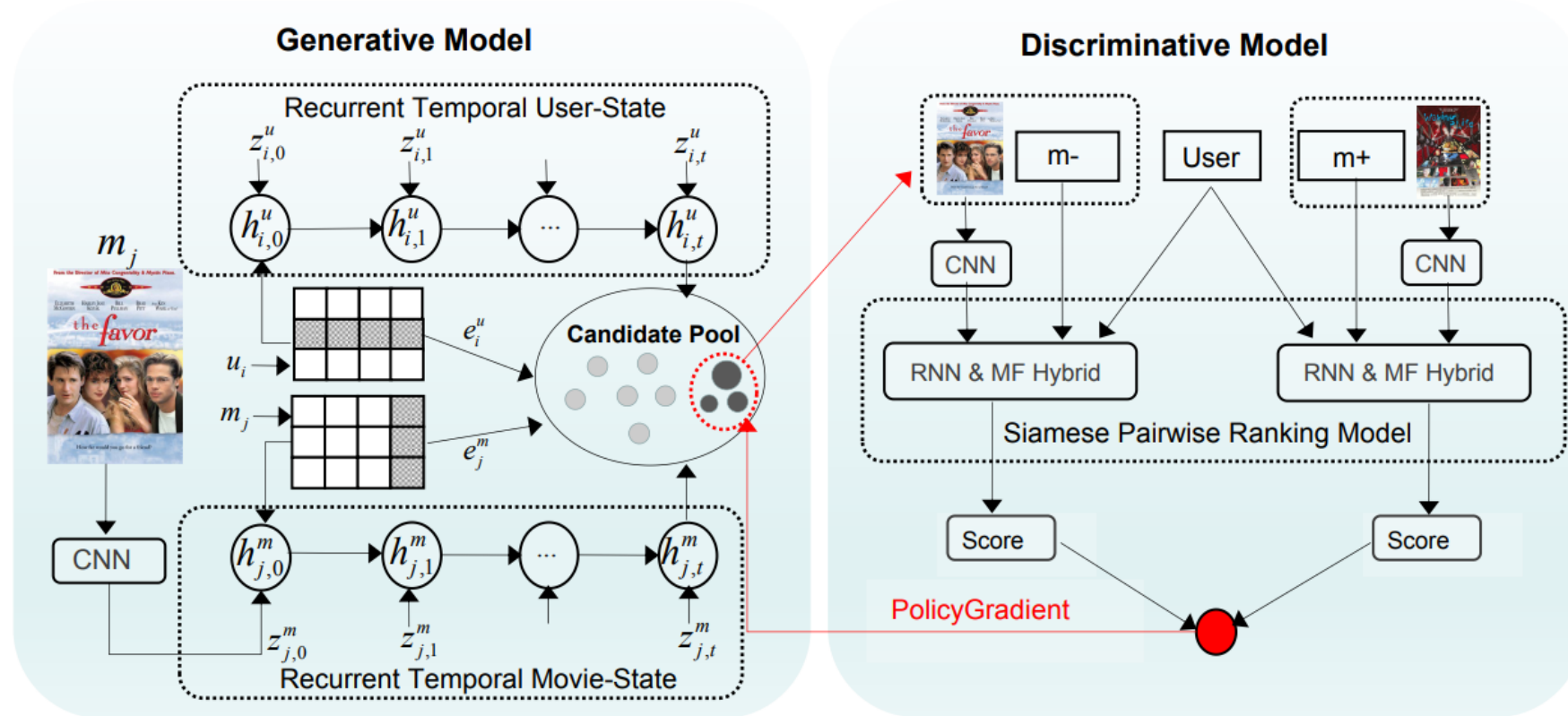
Progress 3: Hilbert Semantic Vector Space
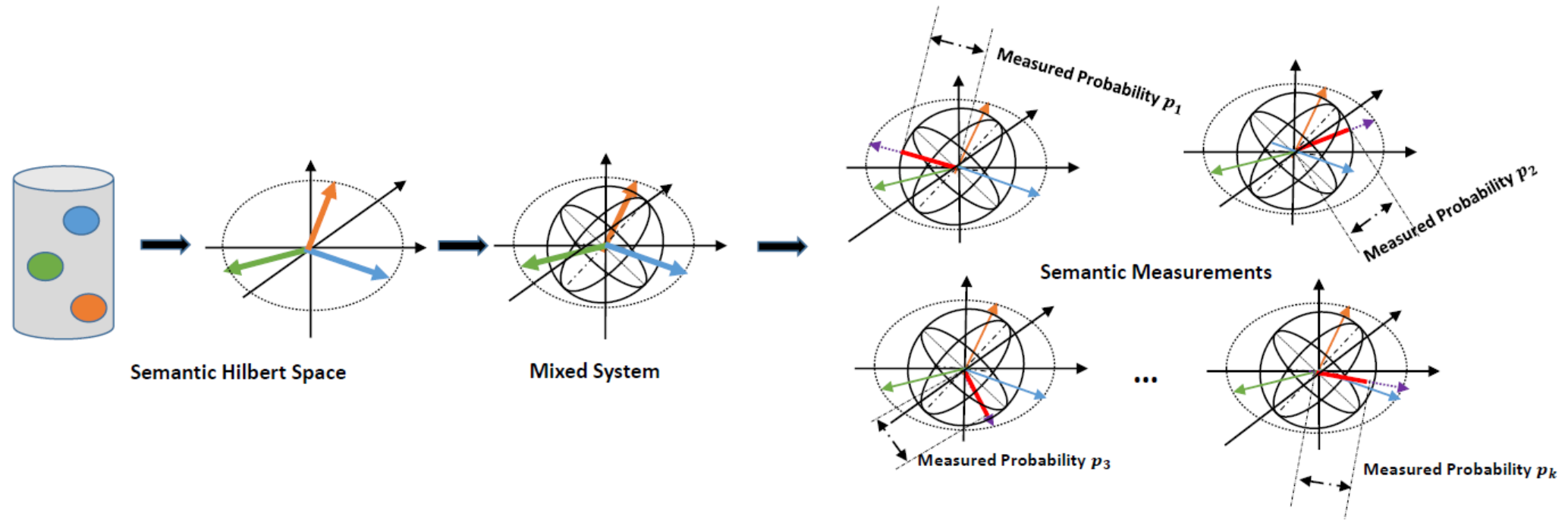
Wang Benyou, Li Q*, Prayag T, Massimo M, Sagar U, Dawei S. Quantum Probability Driven Framework for Sentence Modeling, WSDM 2018 **submission**.
Li Q*, Wang B*, CNM: An Interpretable Complex-valued Network for Matching, AAAI 2018 **submission**.

Progress 4: **Dynamics** in case of RecSys.

Wei Zhao, **Wang Benyou** , Jianbo Ye, Yongqiang Gao, Min Yang, Xiaojun Chen, PLASTIC: Prioritize Long and Short-term Information in Top-n Recommendation using Adversarial Training, **IJCAI 2018**

Future Work

- Deep Investigation of **Quantum-inspired textual representation**
- Quantum-inspired **evolved language model** for dynamic
- Thematic issues in **dynamic corpora**

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