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# Individual Research Project (ESR-2)

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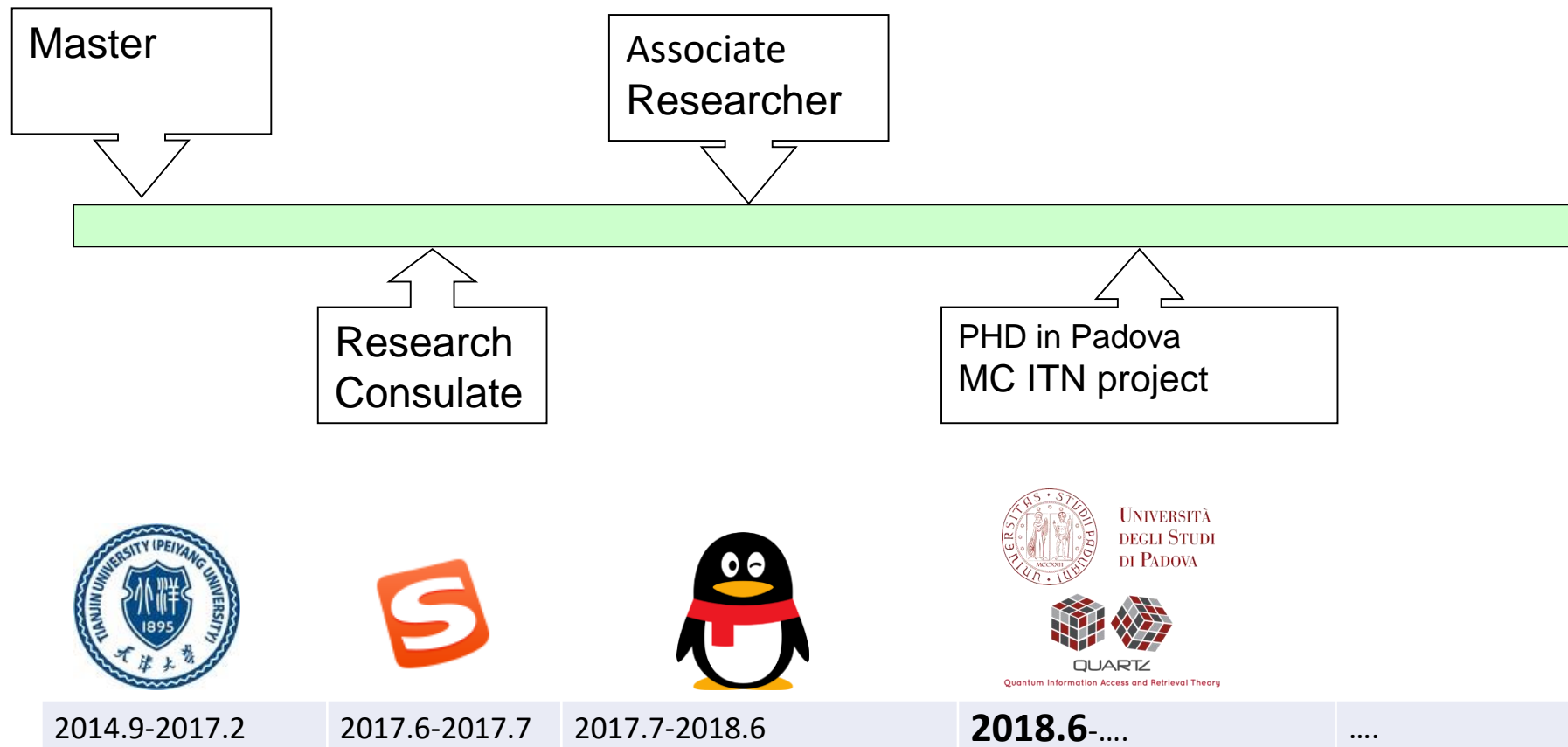
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# Contents

- Self-Introduction
- Research Framework
- Current Progress and future work

# Research Background



# Research



- Publish 15 peer-review papers, including

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



- Google Scholar Citation: 91



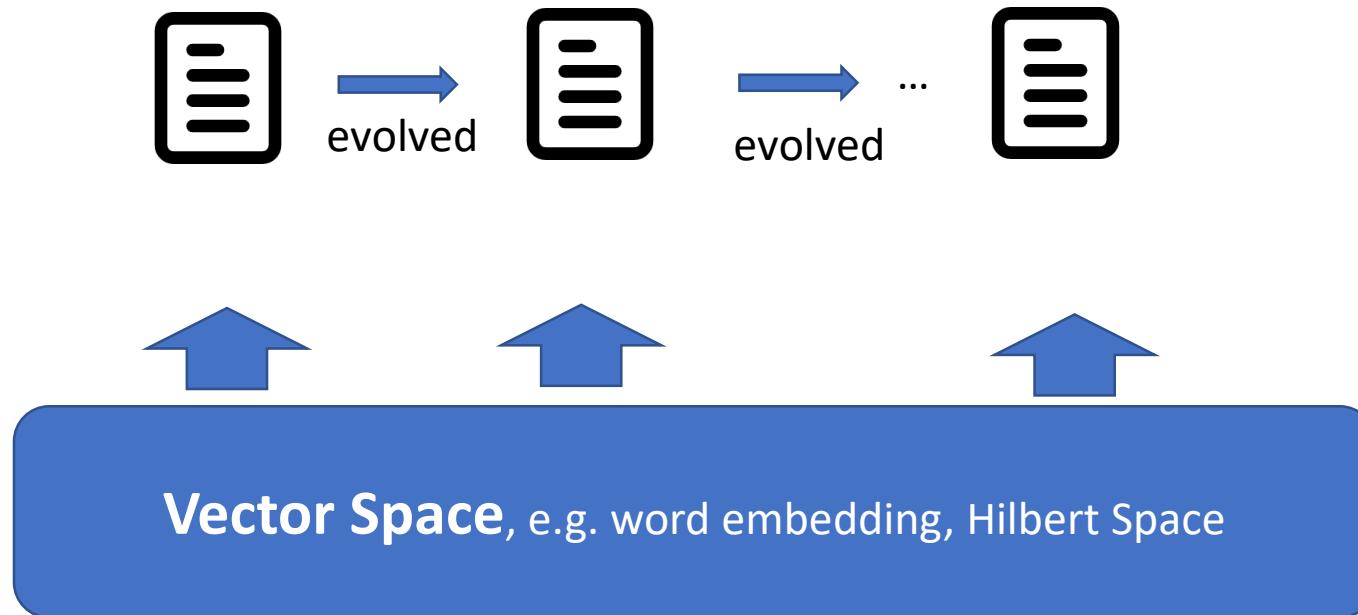
- New Chinese Boob (deep learning and recommendation system) will be published recently.



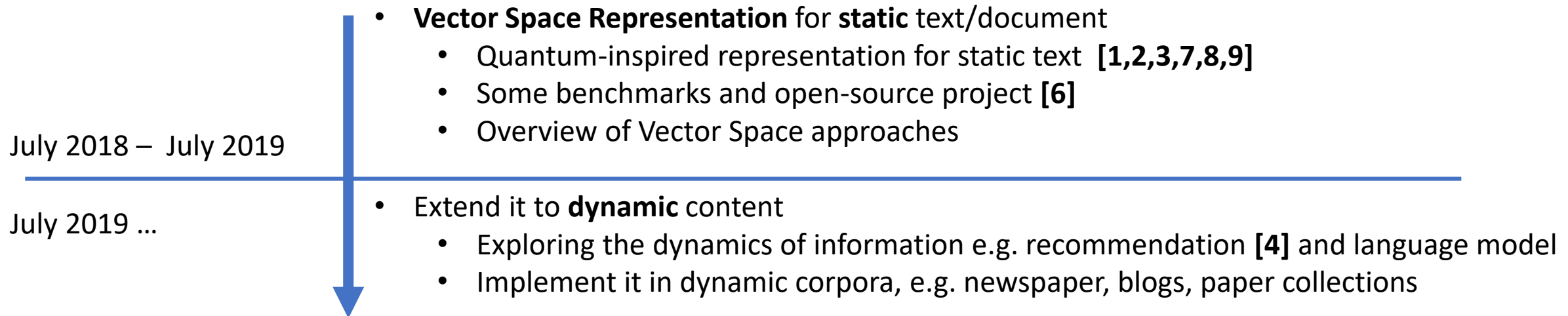
- **SIGIR Best Paper Award Honourable Mentions**

# Research Proposal- ESR2

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

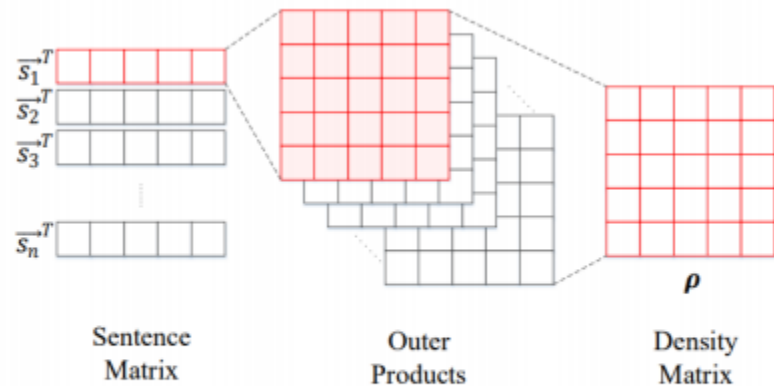


# Research Plan



- [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**.

# Progress1: 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**

# Progress 2: Complex Word Embedding

Interference term for semantic composition

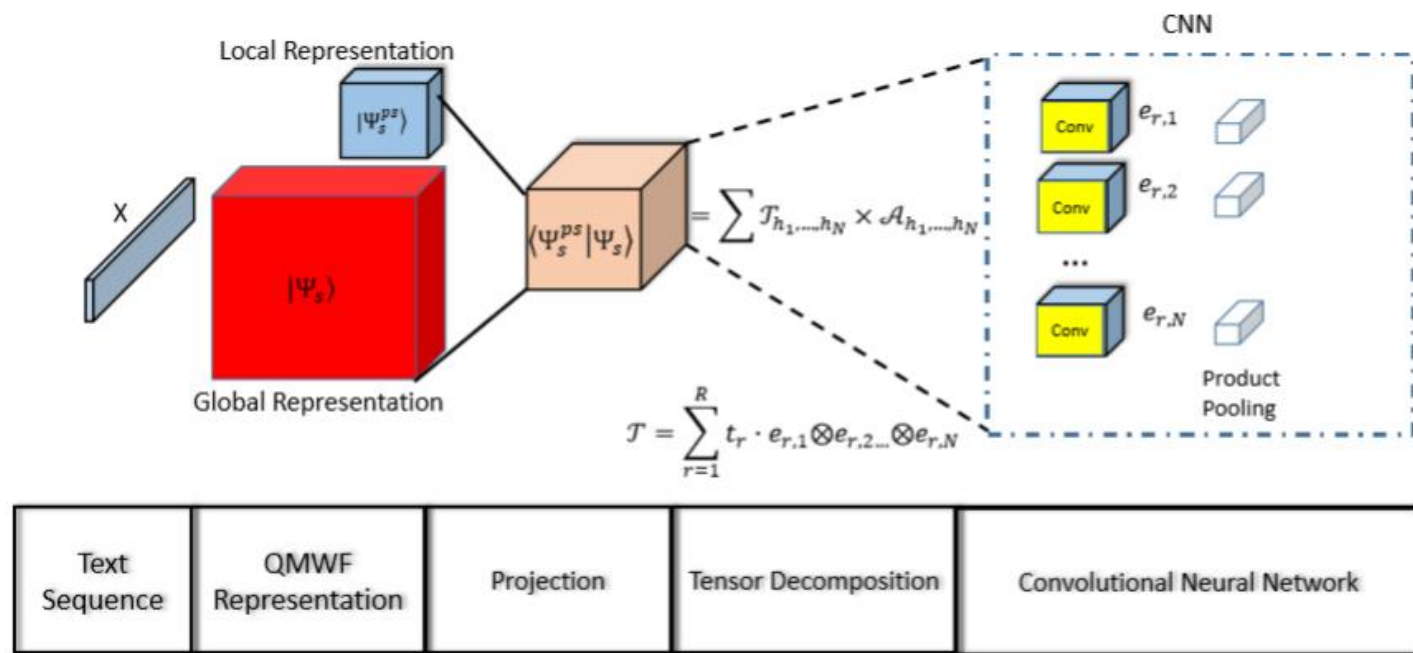
$$\begin{aligned} z^* &= z_1 + z_2 = r_1 e^{i\theta_1} + r_2 e^{i\theta_2} \\ &= \sqrt{r_1^2 + r_2^2 + 2r_1 r_2 \cos(\theta_2 - \theta_1)} \times e^{i \arctan\left(\frac{r_1 \sin(\theta_1) + r_2 \sin(\theta_2)}{r_1 \cos(\theta_1) + r_2 \cos(\theta_2)}\right)} \end{aligned}$$

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**





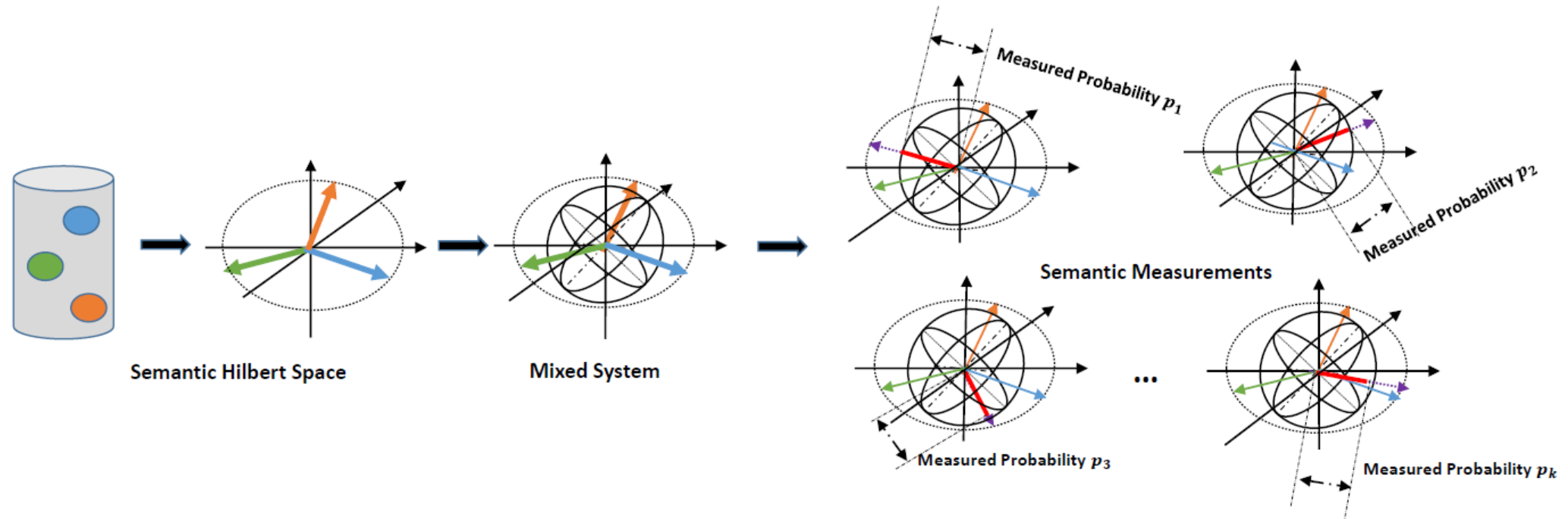
# Progress 3: Quantum Many-body function for text



Use CNN to **approximate** Tensor Decomposition in the projection of Quantum Many-Body Language Function

Peng Zhang, Zhan Su, Lipeng Zhang, **Benyou Wang**, Dawei Song. 2018. A Quantum Many-body Wave Function Inspired Language Modeling Approach. **CIKM 2018**

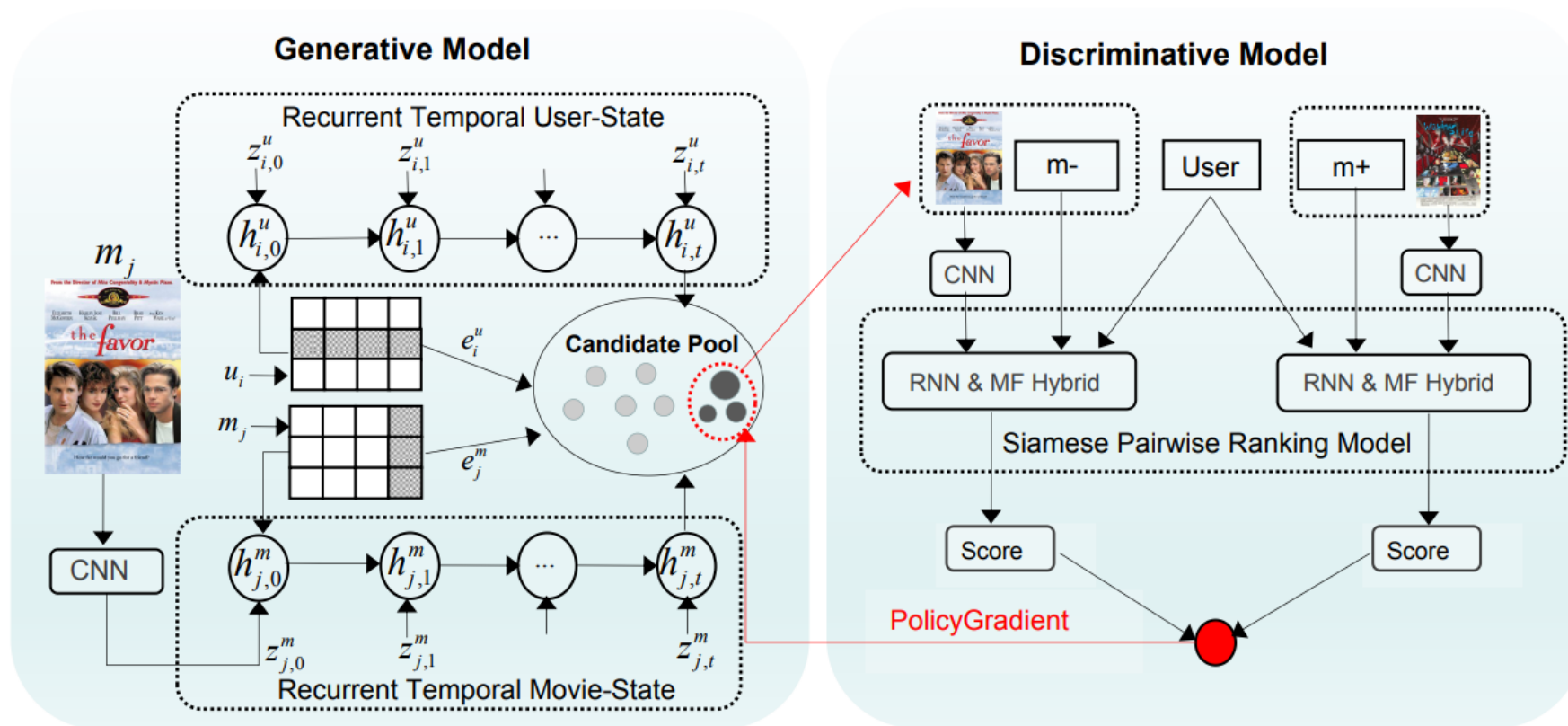
# Progress 4: Hilbert Semantic Space



**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 5: Dynamics in Recommendation System



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**



# Publications

Peng Zhang, Zhan Su, Lipeng Zhang, **Benyou Wang**, Dawei Song. 2018. A Quantum Many-body Wave Function Inspired Language Modeling Approach. **CIKM 2018**

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**

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.

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**

Wei Zhao, **Wang Benyou**, Jianbo Ye, Min Yang, Zhou Zhao, Ruotian Luo, Yu Qiao A Multi-task Learning Approach for Image Captioning, **IJCAI 2018**

**Wang Benyou**, Wang Li. et al. TextZoo, a New Benchmark for Reconsidering Text Classification, in Arxiv. 2018.

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

Zhao Wei, **Wang Benyou** et al. Leveraging Long and Short-term Information in Content-aware Movie Recommendation, in Arxiv. 2018. Zhihu link (in Chinses)

Su Zhan, **Wang Benyou**, Niu Jiabin, Tao Shuchang, Zhang Peng, Song Dawei. Enhanced Embedding based Attentive Pooling Network for Answer Selection. **NLPCC 2017**

Wang Jun, Yu Lantao, Zhang Weinan, Gong Yu, Xu Yinghui, **Wang Benyou**, Zhang Peng, Zhang Dell. IRGAN: A Minimax Game for Unifying Generative and Discriminative Information Retrieval Models. **SIGIR 2017. Best Paper Award Honourable Mentions.**

**Wang Benyou** A Chinese Question Answering Approach Integrating Count-based and Embedding-based Features, in Chinese, master thesis in Tianjin University

Li Jinfei. Wu Yue, Zhang Peng, Song Dawei, **Wang Benyou**. Learning to diversify web search results with a Document Repulsion Model. **Information Sciences**, 411, 136-150. 2017. (factor : 4.832)

Zhang Shengnan, Hou Yuexian, **Wang Benyou**, Song Dawei. Regularizing Neural Networks via Retaining Confident Connections. **Entropy**, 19(7), 313. 2017. (factor : 1.821)

Shang Zhenguo, Li Jinfei, Zhang Peng, Song Dawei, **Wang Benyou**. How Users Select Query Suggestions Under Different Satisfaction States? **CCIR 2017** (pp. 93-105), Springer, Cham. July, 2017.

**Wang Benyou**, Niu Jiabing, Ma Liqun, Zhang Yuhua, Zhang Lipeng, Li Jinfei, Zhang Peng Song, D. . A Chinese Question Answering Approach Integrating Count-Based and Embedding-Based Features. **ICCPOL-NLPCC** . December, 2016

**Wang Benyou**, Zhang Peng, Li Jinfei, Song Dawei, Hou Yuexian, Shang Zhenguo. Exploration of quantum interference in document relevance judgement discrepancy. **Entropy**, 18(4), 144. 2016.

Zhang Peng, Li Jinfei, **Wang Benyou**, Zhao Xiaochao, Song Dawei, Hou Yuexian, Melucci, M. A Quantum Query Expansion Approach for Session Search. **Entropy**, 18(4), 146. 2016. 2015

Chen Yongqiang, Zhang Peng, Song Dawei, **Wang Benyou**. A Real-Time Eye Tracking Based Query Expansion Approach via Latent Topic Modeling. **CIKM 2015** (pp. 1719-1722). ACM. October, 2015

Huang Xin, Wei zhao, **Wang Benyou**, Rui Zhao. Recommendation System and Deep Learning, **Tsinghua University Press**. chapters related "Learn to rank" and "Generative Adversarial Nets(GAN) for Recommendation"