second year project bachelor artificial intelligence

TEAM PERCEPTUM

Recommending document links in the Starfish knowledge graph

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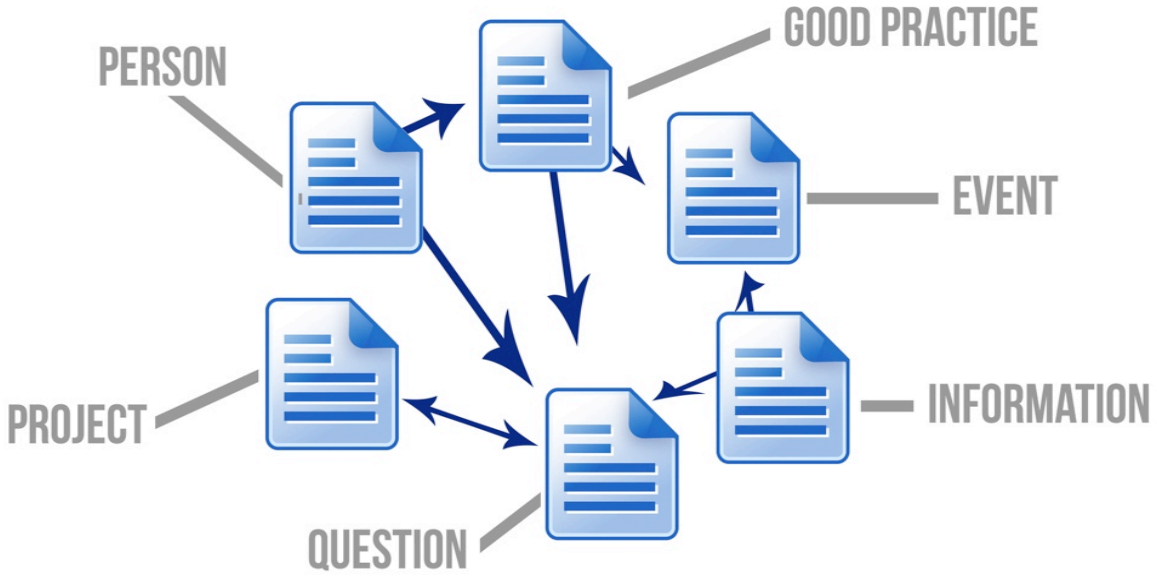
CONTENTS

- Product vision
- Product pipeline
- Evaluation
- Demonstration

PRODUCT VISION

What is Starfish?

Platform for sharing knowledge on education innovation



PRODUCT VISION

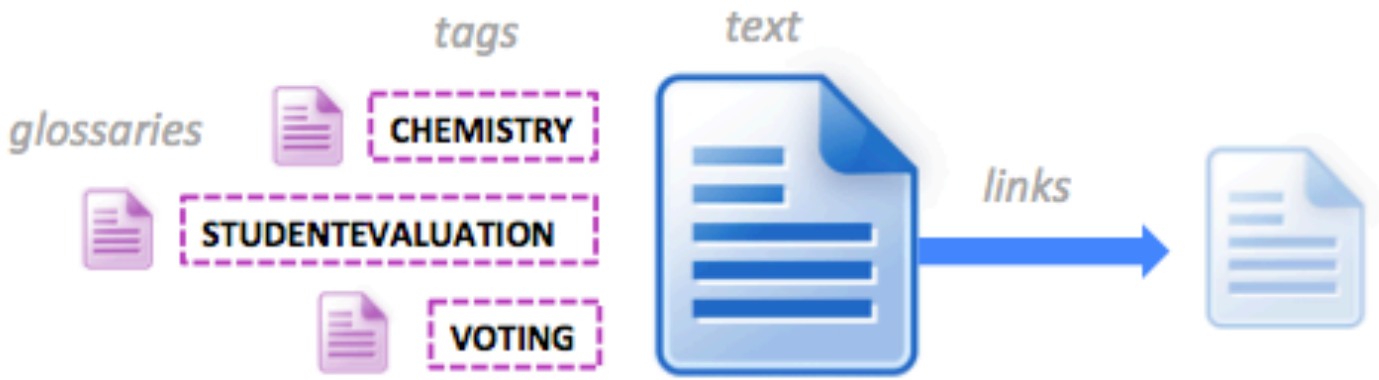
Product pitch

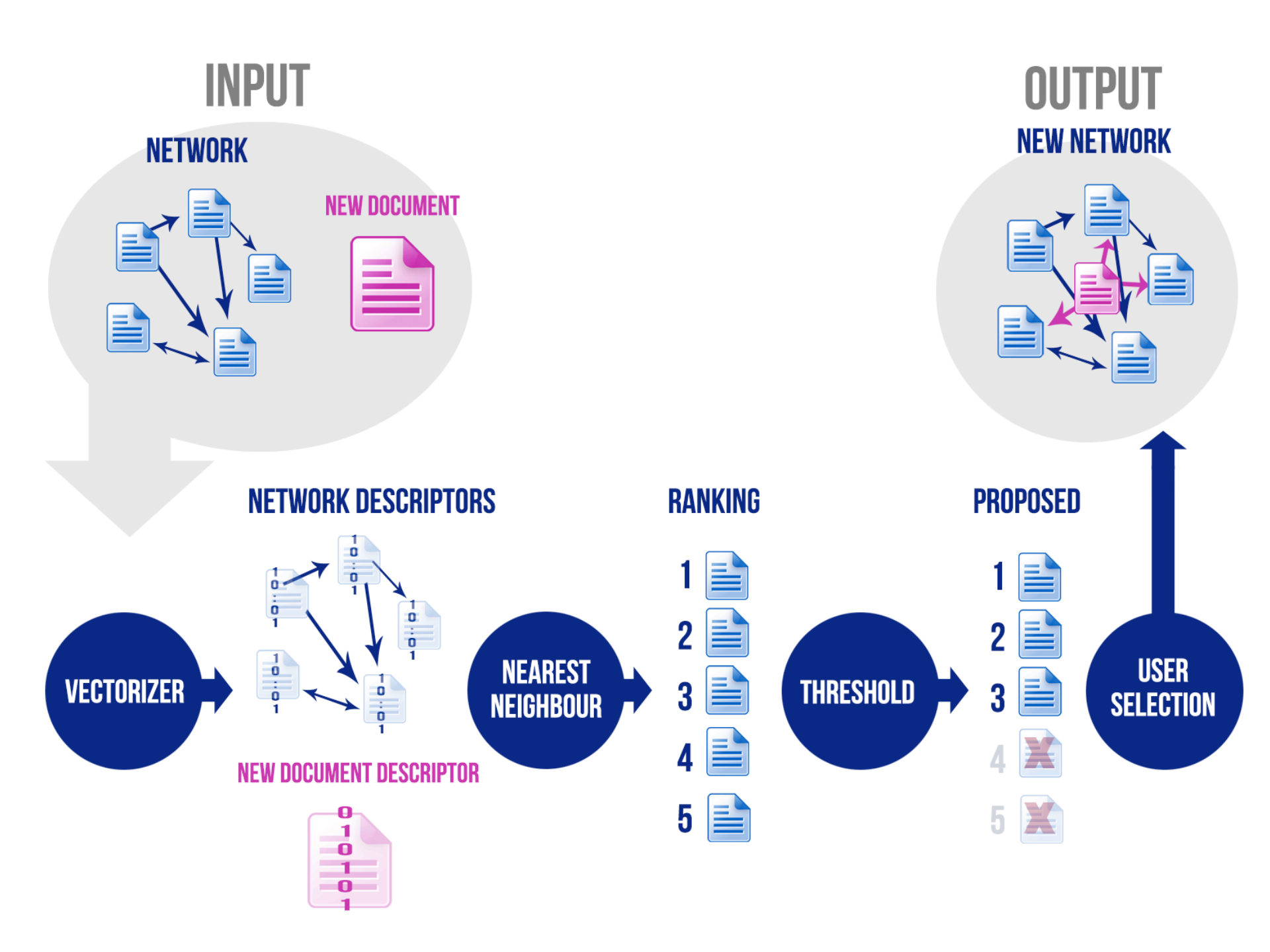
- **For** Startfish users
- **who** search for and edit knowledge in Starfish
- **the** document linker is a core system addition to StarFish
- **that** finds related documents
- **Unlike** moderated or individual/centralized linking our product uses algorithms and data to automatically suggest document links.

DOMAIN

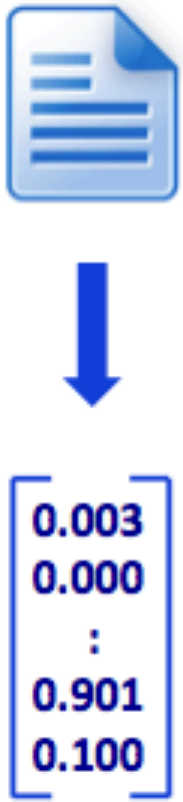
Relevant document properties

- Textual content of documents
- Tags and their glossaries
- Links to other docs




INPUT
NETWORK
NEW DOCUMENT
OUTPUT
NEW NETWORK
NETWORK DESCRIPTORS
VECTORIZER
NEAREST NEIGHBOUR
RANKING
1
2
3
4
5
THRESHOLD
PROPOSED
1
2
3
4
5
USER SELECTION
NEW DOCUMENT DESCRIPTOR

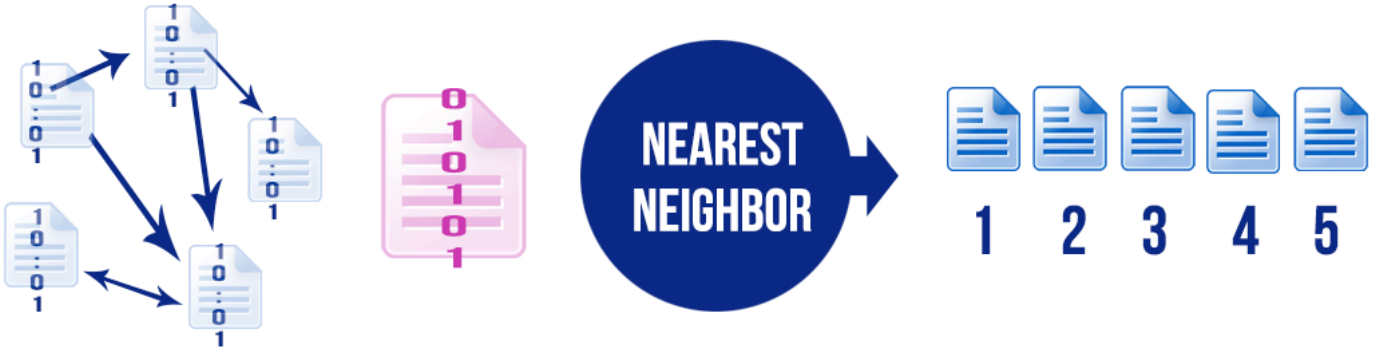
VECTORIZER



- **TEXT BASED**: bag of words and TF-IDF
  1. Textvectorizer
  2. Weighted textvectorizer
- **TAG BASED**: occurences and co-occurences of tags
  1. Simple tag vectorizer
  2. Tag smoothing vectorizer
- **HYBRID**: TF-IDF of glossaries of tags
  1. Glossaries of tags
  2. Weighted glossaries of tags

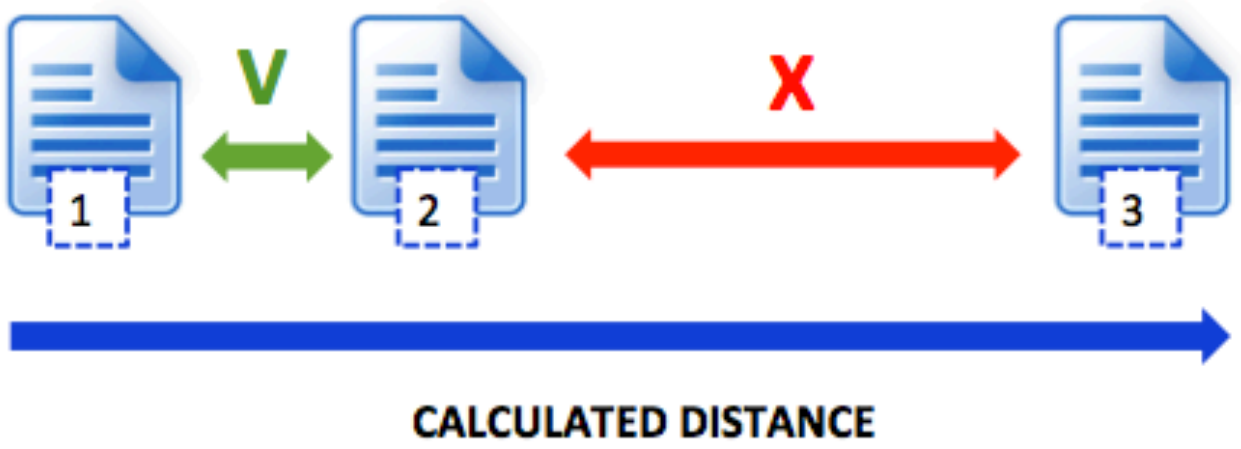
K-NEAREST NEIGHBOR

- Calculate **distance** between descriptor of new document and descriptor of the knowledge base
  1. Cosine
  2. Correlation
- **Rank** documents based on their distances



THRESHOLD

Cut off the number of returned documents based on the **difference between distances** of two consecutive ranks



EVALUATION METRICS

- **WITHOUT THRESHOLD**: system returns same amount of links as the document is known to have

  Accuracy: correct docs / relevant docs

- **WITH THRESHOLD:**

  Precision: correct docs / returned docs

  User friendliness

  Recall: correct docs / relevant docs

  Knowledge base coverage

VECTORIZER PERFORMANCE

TABLE

VECTORIZER PERFORMANCE

- **TEXT BASED**
  - + xx % accuracy on Questions
  - - Relatively slow
  - - Only applicable to textual content
  - - Bad at handling language differences
- **TAG BASED:**
  - + xx % accuracy overall document types
  - - xx % accuracy on Questions
  - - Bad performance on no or badly labeled tags

EVALUATION THRESHOLD

TABLE

EVALUATION THRESHOLD

- **COMPARED WITH ACCURACY ON FIXED LINKS:**
  - + Higher precision/recall if tag-based/hybrid
  - - Lower recall and precision of text-based

DEMONSTRATION

CONCLUSIONS

- Use *weighted text vectorizer* for Questions
- Use *simple tag vectorizer* for the rest
- Overall performance of entire pipeline:
  - **Precision**: xx% of the recommendations make sense
  - **Recall**: xx% of the relevant documents in the knowledge base are shown

CONCLUSIONS

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- Overall performance of entire pipeline:
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ACKNOWLEDGEMENTS

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QUESTIONS?

Feel free to ask us!