TUI – Some Key Facts

- Revenue: €18.5 Billion*
- Market Capitalization: €10 Billion**
- Underlying EBITA: €1.1 Billion*
- Employees: 67,000
- Hotels: 381
- Cruise Liners: 16
- Travel Agencies in Europe: About 1,600
- Listed in the FTSE-100
- Based in Germany
- Market Capitalization: €10 Billion**
- > 20 Billion Customers

* Numbers based on FY 2017  ** As at January 2018
KNIME Use Case: Classification of Customer Feedback
Use Case: Initial Situation

• Incoming Feedback has to be read by a person to extract key information
  → Amount of feedback texts: up to 500 replies per day in the peak season!

• Simple approach: Analysis of term frequencies or comparison with word lists
  → Room for improvement

• TUI payed an external service provider to read and classify a part of the data
  - 800 texts per month
  - only those texts connected to poor ratings
  → Information loss!

• Objective: Extract topic and sentiment context from a feedback text

• Solution: Recurrent Convolutional Neural Networks (RCNNs)
Our flight was delayed but the hotel was very nice.
Our flight was delayed but the hotel was very nice.
Modell Overview

Text \[\rightarrow\] Contextualisation

Forward LSTM (600 Neurons) \[\rightarrow\] Concatenate + Dense

Word i \[\rightarrow\] Max Pooling

Backward LSTM (600 Neurons) \[\rightarrow\]

Dropout

Dense

Dense/Softmax

400 Neurons \[\rightarrow\] 400 Neurons

35%

3 Times

400 Neurons

\[\rightarrow\] [Green]

\[\rightarrow\] [Red]

\[\rightarrow\] [Blank]
## Modell Performance

<table>
<thead>
<tr>
<th>Topic Class</th>
<th>Sentiment</th>
<th>Recall</th>
<th>Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation</td>
<td>Positive</td>
<td>78%</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>83%</td>
<td>88%</td>
</tr>
<tr>
<td>Before Travel</td>
<td>Positive</td>
<td>71%</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>73%</td>
<td>68%</td>
</tr>
<tr>
<td>Destination Service</td>
<td>Positive</td>
<td>64%</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>90%</td>
<td>75%</td>
</tr>
<tr>
<td>Flight &amp; Airport</td>
<td>Positive</td>
<td>40%</td>
<td>87%</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>88%</td>
<td>87%</td>
</tr>
<tr>
<td>Price &amp; Finance</td>
<td>Positive</td>
<td>68%</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>68%</td>
<td>59%</td>
</tr>
<tr>
<td>Transfer</td>
<td>Positive</td>
<td>46%</td>
<td>69%</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>80%</td>
<td>74%</td>
</tr>
</tbody>
</table>
General Process Layout

**KNIME Server**
- Training Workflow
- Model Files
- Classification Workflow
- Daily Batch Process via KNIME Scheduling

**DB2 Database**
- Daily Batch Process
- Unclassified Data
- Classified Data

**Tibco Spotfire**
- Presentation
- Evaluation

- **Daily Batch Process via KNIME Scheduling**
- **Unclassified Data**
- **Classified Data**
Classification Workflow

- Python Integration
- Deep Learning – Keras Integration
- Virtual Nodes
- Text Tokenizing
- Multi-Threading
Our flight was delayed but the hotel was very nice.

Feedback Classification in KNIME

File Paths

Create File Paths
Node 803

Load Data

CSV Reader
Customer Feedback
Classification Models

Data Preprocessing

GroupBy
Max Sequence Length
Preprocessing
Tokenizing

Table Row to Variable
Max Sequence Length
NPS Sorting
Sort columns from a-z
Feedback Classification in KNIME

- Case Converter
- Column Rename
- String Manipulation
- Python Script (1→1)
  - nps_offen
  - remove punctuation
  - Tokenize with stored tokenizer
  - Document Body Text
Feedback Classification in KNIME
Feedback Classification in KNIME
Feedback Classification in KNIME

![Image of KNIME Aggregated Data window with aggregated data and classifications for different categories such as Flight, Price & Finance, TUI Staff at Resort, and Accommodation. The data includes columns for Row ID, Brand, Hotel, Date, Document body text, and predicted class scores for each row.]