Temporally-oriented possession:
A corpus for tracking possession over time

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Motivation: Possession Timelines

The Night Café, van Gogh (1888)
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1888: van Gogh creates painting

Ivan Morozov has painting in Moscow

1930: held by Soviet authorities

Stephen Carlton Clark

Now: Yale, New Haven, CT

The Night Café, van Gogh (1888)
Motivation: Extract timelines from text

The Night Café

*The Night Café* (French: *Le Café de nuit*) is an oil painting created by Dutch artist [Vincent van Gogh](https://en.wikipedia.org/wiki/Vincent_van_Gogh) in September 1888 in *Arles*. Its title is inscribed lower right beneath the signature. The painting is owned by [Yale University](https://en.wikipedia.org/wiki/Yale_University) and is currently held at the [Yale University Art Gallery](https://en.wikipedia.org/wiki/Yale_University_Art_Gallery) in New Haven, Connecticut.

The interior depicted is the *Café de la Gare*, 30 Place Lamartine, run by Joseph-Michel Ginoux and his wife Marie, who in November 1888 posed for Van Gogh's and Gauguin's *Arlésienne*: a bit later, Joseph Ginoux evidently posed for both artists, too.

...
The Night Café

*The Night Café* (French: *Le Café de nuit*) is an oil painting created by Dutch artist Vincent van Gogh in September 1888 in Arles.[1] Its title is inscribed lower right beneath the signature. The painting is owned by Yale University and is currently held at the Yale University Art Gallery in New Haven, Connecticut.

The interior depicted is the *Café de la Gare*, 30 Place Lamartine, run by Joseph-Michel Ginoux and his wife Marie, who in November 1888 posed for Van Gogh's and Gauguin's *Arlésienne*; a bit later, Joseph Ginoux evidently posed for both artists, too.

- 1888: van Gogh creates painting
- Now: Yale, New Haven, CT
This work

- 90 Wikipedia articles about well-known artifacts
- Annotated for possession relationships, temporal information related to possession, and certainty
- Annotation process requires inference and reasoning - these are very human annotations
- Goal: better understanding of strategies for automating extraction of possession timelines
Previous computational work on possession

- Semantic relation extraction from (canonical) English possessives
  [Tratz and Hovy 2013]

- Extraction of possession relations from English noun compounds
  [Nakov and Hearst 2013, Tratz and Hovy 2010]

- Annotation of English genitives with adpositional supersenses
  [Blodgett and Schneider 2018]

- Extraction of possession relations from blog posts
  [Banea et al. 2016]

- Syntactically-conditioned extraction of possession relations from OntoNotes
  [Chinnappa and Blanco 2018a]
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What kinds of possessions do we address?

- Only alienable and control possession

- Broad notion of possession: from ownership to temporary possession to location

- Only concrete possessees

- Possessors restricted to people, organizations, and places

- All forms of expression: phrasal, clausal, sentential, inter-sentential
Data selection

- 90 Wikipedia articles about well-known artifacts: mostly paintings, but also diamonds, relics, sculptures, and archaeological findings

- Chosen because such objects tend to change hands

- Each article focuses on a single artifact/possessee

- Minimum of three different possessors
Annotation process - per article

- Topic of article is single possessee; annotator instructed to read entire article

- Identify possessors

- Identify temporal anchors per possession relation (i.e. possessee/possessor pair)

- Specify duration features per temporal anchor

- Assign an order to identified possession relations
Step One: Identify possessors
Step One: Identify possessors

- Only one relation generated for each period of possession, regardless of number of mentions
Step One: Identify possessors

- Only one relation generated for each period of possession, regardless of number of mentions
Step One: Identify possessors

- Only one relation generated for each period of possession, regardless of number of mentions
- Possessors limited to persons, organizations, locations (not only NEs)
Identifying possessors

**History**

Van Gogh used the picture to settle debts with Ginoux, the landlord said to be depicted (standing) in it.[3] Formerly a highlight of the Ivan Morozov collection in Moscow, the painting was nationalized and sold by the Soviet authorities in the 1930s. The painting was eventually acquired by Stephen Carlton Clark, who bequeathed it to the art gallery of Yale University.
Identifying possessors

History [ edit ]

Van Gogh used the picture to settle debts with Ginoux, the landlord said to be depicted (standing) in it.[3] Formerly a highlight of the Ivan Morozov collection in Moscow, the painting was nationalized and sold by the Soviet authorities in the 1930s. The painting was eventually acquired by Stephen Carlton Clark, who bequeathed it to the art gallery of Yale University.

On the morning of March 18, 1990, thieves disguised as police officers broke into the museum and stole The Storm on the Sea of Galilee and 12 other works.
Step One: Identify possessors

- Only one relation generated for each period of possession, regardless of number of mentions
- Possessors limited to persons, organizations, locations (not only NEs)
- Each relation labeled with certainty according to textual evidence
Possession certainty

- Yes/no annotation - according to the textual content, is the possession relation certain?

It is in the Gemäldegalerie, Dresden.

It was completed after Giorgione’s death in 1510, [...] generally accepted to have been completed by Titian.
Step Two: Identify temporal anchors

- Where possible, each relation associated with temporal anchor
- Granularity no finer than the year: often span of years, or historical event (e.g. “WW1”)
Temporal anchors

• Not all possession relations can be associated with temporal anchors

Despite its progressive implications, Barge Haulers was bought by the Tsar’s second son. It was lent for exhibition at the 1873 International Exhibition in Vienna, where it won a bronze medal. It was exhibited outside Russia again in 1878.
Step Three: Duration of possession

- For relations with temporal anchors, duration is annotated
- Three binary features: before, during, after
Duration of possession

- Duration viewed as attribute of the temporal anchor

BEFORE: *At some undetermined point before 1516 it came into the possession of Don Diego de Guevara...*

DURING: *In 1599 a German visitor saw it in the Alcazar Palace in Madrid.*

AFTER: *In 1530 the painting was inherited by Margaret’s niece Mary of Hungary, who in 1556 went to live in Spain.*
Step Three: Duration of possession

- For relations with temporal anchors, duration is annotated
- Three binary features: before, during, after
- Certainty is also marked for duration
Step Four: Order of possessions

- Finally, all possessions are ordered
- In essence, this step produces a gold standard possession timeline
Full annotation for *The Night Café*

<table>
<thead>
<tr>
<th>NE</th>
<th>Possessor</th>
<th>Poss. Certainty</th>
<th>Order</th>
<th>Temporal Anchor</th>
<th>Duration</th>
<th>Dur. Certainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>PER</td>
<td>Vincent van Gogh</td>
<td>C</td>
<td>1</td>
<td>1888</td>
<td>During</td>
<td>C</td>
</tr>
<tr>
<td>PER</td>
<td>Ivan Morozov</td>
<td>C</td>
<td>2</td>
<td>Unknown</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PER</td>
<td>Stephen Carlton Clark</td>
<td>C</td>
<td>4</td>
<td>Unknown</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ORG</td>
<td>Soviet authorities</td>
<td>C</td>
<td>3</td>
<td>1930</td>
<td>Before</td>
<td>C</td>
</tr>
<tr>
<td>ORG</td>
<td>Yale University</td>
<td>C</td>
<td>5</td>
<td>Unknown-Now</td>
<td>During</td>
<td>C</td>
</tr>
<tr>
<td>LOC</td>
<td>Moscow</td>
<td>C</td>
<td>2</td>
<td>Unknown</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LOC</td>
<td>New Haven, CT</td>
<td>C</td>
<td>5</td>
<td>Unknown-Now</td>
<td>During</td>
<td>C</td>
</tr>
</tbody>
</table>
Timeline for *The Night Café*
## Annotation statistics

<table>
<thead>
<tr>
<th>All possessors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of possessors</td>
<td>799</td>
</tr>
<tr>
<td>NE type: PER/ORG/LOC</td>
<td>281/318/200</td>
</tr>
<tr>
<td>Possession certainty: Certain/Uncertain</td>
<td>774/25</td>
</tr>
<tr>
<td>Temporal Anchor: Known/Unknown</td>
<td>660/139</td>
</tr>
<tr>
<td>Duration:BEFORE/DURING/AFTER</td>
<td>7/647/6</td>
</tr>
<tr>
<td>Duration Certainty: Certain/Uncertain</td>
<td>608/52</td>
</tr>
</tbody>
</table>
Annotator agreement

- 12 randomly-selected articles labeled by second annotator; Anno. A treated as pseudo-gold standard

<table>
<thead>
<tr>
<th>Annotation step</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of possessors</td>
<td>0.97 P / 0.69 R</td>
</tr>
<tr>
<td>Certainty (both possession and duration)</td>
<td>0.92 K</td>
</tr>
<tr>
<td>Temporal Anchor</td>
<td>0.77 K</td>
</tr>
<tr>
<td>Possession Duration</td>
<td>0.76 K</td>
</tr>
<tr>
<td>Order of possessions</td>
<td>0.93 P / 0.90 R</td>
</tr>
</tbody>
</table>
Wrapping up

• Corpus of articles annotated for **temporally-oriented possession**

• Expanding range of forms to be annotated increases coverage of possession relations, while reducing learnability (for the machine)

• Knowledge-heavy annotations; may be useful for detailed analysis

• Knowledge-heavy annotations; were not useful for learning (we tried)
Extensions

- Recent work (Chinnappa and Blanco, EMNLP 2018) takes new, simpler approach to annotation (same data)

  - Potential possessors and years extracted automatically

  - All possible possessor-year pairs are labeled

  - This data moderately successful for learning to extract possession relations more robustly

- In progress: multimodal possession extraction
References

Bach, E.
## Corpus statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Total # of Wikipedia articles</td>
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</tr>
<tr>
<td>Total # of mentioned possessors</td>
<td>799</td>
</tr>
<tr>
<td>Total # of unique possessors</td>
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</tr>
<tr>
<td>Avg. # of words per article</td>
<td>2315</td>
</tr>
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<td>Avg. # of sections per article</td>
<td>6.66</td>
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<tr>
<td>Avg. # of possessors per article</td>
<td>8.87</td>
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<tr>
<td>Avg. # of unique possessors per article</td>
<td>8.17</td>
</tr>
</tbody>
</table>