Annotating Narrative Images

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Jataka tale of the nine-colored deer

- It is a mural image and the original mural was located at No. 257 Mogao cave in Gansu province and painted during the Northern Wei dynasty of China.
1. The nine-colored deer walked along a river.

2. It saved a drowning person from the river.

3. The drowning person gave his thanks to the deer on his knees,......
4. The queen talked about her dream about a nine-colored deer to the king.

5. The Drowning person told the whereabouts of the deer to the king and the queen in the palace and snitched on the deer.
6. The king made an order to hunt the deer with his army

7. At the same time, the deer was sleeping
8. The deer got caught and confronted with the king. It told the cause and effect of the whole thing to the king.

9. The drowning person got punished due to his dishonesty.
The nine-colored deer saved a drowning person when it walked along a river. The drowning person gave his thanks to the deer on his knees, and the deer told the drowning person not to disclose its location. At the same time, in the palace, the queen talked about her dream about a nine-colored deer to the king. After the drowning person came back home, he told the whereabouts of the deer to the king and the queen in the palace and snitched on the deer. Then the king made an order to hunt the deer with his army. At last, the deer got caught and confronted with the king, and it told the cause and effect of the whole thing to the king. Finally, the drowning person got punished due to his dishonesty.
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The nine-colored deer saved a drowning person when it walked along a river. The drowning person gave his thanks to the deer on his knees, and the deer told the drowning person not to disclose its location. At the same time, in the palace, the queen talked about her dream about a nine-colored deer to the king. After the drowning person came back home, he told the whereabouts of the deer to the king and the queen in the palace and snitched on the deer. Then the king made an order to hunt the deer with his army. At last, the deer got caught and confronted with the king, and it told the cause and effect of the whole thing to the king. Finally, the drowning person got punished due to his dishonesty.
<table>
<thead>
<tr>
<th>Models</th>
<th>Main classes and core properties between events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuffield [5]</td>
<td>Fabula, Story, Narrative</td>
</tr>
<tr>
<td>Stories Ontology [6]</td>
<td>EventList, EventSlot, Interpretation, Story events(Story, EventList), item(EventSlot, Event) slot(EventList, EventSlot), sub_story(Story, Story)</td>
</tr>
<tr>
<td>Storytelling Ontology [7]</td>
<td>Story, Scene, Agent, Event, Role, Concept</td>
</tr>
<tr>
<td>Fabio Ciotti [8]</td>
<td>Actant, Action, Actor, Event, Quality, Object, Place</td>
</tr>
<tr>
<td>Rossana [9]</td>
<td>Story, Entity, GeographicalPlace, Dynamics TemporalCollocation, Artifacts</td>
</tr>
<tr>
<td>ABC Ontology [10]</td>
<td>Entity, Actuality, Temporality, Abstraction Event, State, Action, Agent Situation as an intermediary and properties like follows and precedes are designed</td>
</tr>
<tr>
<td>BBC storyline ontology [11]</td>
<td>Event, Storyline, StorylineSlot, Topic follows(StorylineSlot, StorylineSlot)</td>
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<tr>
<td>SEM [12]</td>
<td>Type, Actor, Object, Role, Temporary, Even, Place Time, hasSubEvent(Event, Event)</td>
</tr>
<tr>
<td>Activity ontology [13]</td>
<td>Activity, Person, PhysicalEntity, Area hasSubActivity(Activity, Activity)</td>
</tr>
<tr>
<td>Event Pattern [14]</td>
<td>Event, SpatioTemporalExtent, ParticipantRole InformationObject, SubEventOf(Event, Event)</td>
</tr>
<tr>
<td>Event-model F [16]</td>
<td>Event, Situation, Role, Quality, Object, Description isEventIncludedIn(Event, Situation)</td>
</tr>
</tbody>
</table>

- Event Detection, Representation and Exploitation
- Dive+
- NewsReader
- Linked open piracy
- Event detection from YouTube videos, Wikipedia, Twitter, news articles.....

**CIDOC-CRM, ODPs, OAC**
Narrative Image Annotation Ontology
Narrative Image Annotation
<table>
<thead>
<tr>
<th>number</th>
<th>type</th>
<th>name</th>
<th>hasRole</th>
<th>hasAction</th>
<th>nextPlot</th>
<th>hasEntity</th>
<th>overlaps</th>
<th>hasSetting</th>
<th>hasAction_2</th>
<th>plotorder</th>
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<tbody>
<tr>
<td>19</td>
<td>19</td>
<td>事情</td>
<td></td>
<td>说梦#13</td>
<td>20</td>
<td>12,13</td>
<td>20</td>
<td>1</td>
<td></td>
<td>4</td>
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<tr>
<td>20</td>
<td>20</td>
<td>情节</td>
<td></td>
<td>告密#12</td>
<td>21</td>
<td>11,12,13</td>
<td>19</td>
<td>1</td>
<td></td>
<td>5</td>
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<tr>
<td>21</td>
<td>21</td>
<td>情节</td>
<td></td>
<td>追捕#14，指认</td>
<td>22</td>
<td>7,8,9,10</td>
<td>23</td>
<td>1</td>
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Annotation Results (Cont.)
Annotation Results

```xml
<http://niao.whu.edu.cn/anno1> a oa:Annotation;
   oa:hasBody <http://niao.whu.edu.cn/body1>;
   oa:hasTarget <http://niao.whu.edu.cn/thing1>;
<http://niao.whu.edu.cn/body1>
   niao:referTo <http://niao.whu.edu.cn/plot1>;
<http://niao.whu.edu.cn/plot1> a niao:Plot;
```

```xml
<http://niao.whu.edu.cn/anno2> a oa:Annotation;
   oa:hasBody <http://niao.whu.edu.cn/body1> ;
   oa:hasTarget [oa:hasSource <http://niao.whu.edu.cn/thing1> ;
   oa:hasSelector [a oa:SvgSelector ;
   dcterms:conformsTo <https://www.w3.org/TR/SVG11/> ;
   rdf:value <svg><circle cx = "120" cy = "150" r = "10"/></svg>
   cx 120;
   cy 150;
   r 10]] .
<http://niao.whu.edu.cn/body1>
   niao:referTo <http://niao.whu.edu.cn/plot1>;
```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX miao: <http://miao.vui.cmu.edu#>
PREFIX on: <http://www.w3.org/2000/10/swap-oncore#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX sif: <http://sif.io/api/image/2.1#>

SELECT ?name ?plotname ?plotregion WHERE {
    ?i miao:filename ?name.
    ?i miao:hasAnnotation ?a.
    ?a on:hasBody ?b.
    ?o miao:name ?plotname.
    ?o on:hasTarget ?t.
    ?t on:hasSelector [rdf:value ?plotregion].
} ORDER BY ?o LIMIT 60

<table>
<thead>
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<th>name</th>
<th>plotname</th>
<th>plotregion</th>
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<td>九色鹿敖步</td>
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</tr>
<tr>
<td>original.jpg</td>
<td>九色鹿救落水人阎达</td>
<td>&quot;name&quot;: &quot;rect&quot;,&quot;x&quot;:234,&quot;y&quot;:260,&quot;width&quot;:320,&quot;height&quot;:326</td>
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<tr>
<td>original.jpg</td>
<td>落水人阎达谢恩</td>
<td>&quot;name&quot;: &quot;rect&quot;,&quot;x&quot;:554,&quot;y&quot;:139,&quot;width&quot;:545,&quot;height&quot;:374</td>
</tr>
<tr>
<td>original.jpg</td>
<td>王后说梦</td>
<td>&quot;name&quot;: &quot;rect&quot;,&quot;x&quot;:2872,&quot;y&quot;:6,&quot;width&quot;:602,&quot;height&quot;:602</td>
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<tr>
<td>original.jpg</td>
<td>阎达告密</td>
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<tr>
<td>original.jpg</td>
<td>国王追捕九色鹿</td>
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<td>original.jpg</td>
<td>乌鸦叫醒九色鹿</td>
<td>&quot;name&quot;: &quot;rect&quot;,&quot;x&quot;:944,&quot;y&quot;:16,&quot;width&quot;:469,&quot;height&quot;:152</td>
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<tr>
<td>original.jpg</td>
<td>国王和九色鹿当面对战</td>
<td>&quot;name&quot;: &quot;rect&quot;,&quot;x&quot;:1102,&quot;y&quot;:25,&quot;width&quot;:827,&quot;height&quot;:418</td>
</tr>
</tbody>
</table>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX mio: <http://mio.me/2010/01/mio#>
PREFIX iiif: <http://iiif.io/api/image/2.1#>

SELECT ?name ?plotname ?plotregion WHERE {
  ?mio filename ?name.
  ?mio hasNote ?n.
  ?n owl:hasBody ?b.
  ?b mio referTo ?p.
  ?p mio plotorder ?o.
  ?o mio name ?plotname.
  ?a owl:hasTarget ?t.
  ?t owl:hasSelector [rdf value ?plotregion].
}
ORDER BY ?o LIMIT 50
Summary

- NIAO is suitable for modeling plot and action level content;
- NIA is designed to be used manually;
- Granularity of a plot’s region in narrative image may be different by different annotators.

Future Work

• Use computer vision technology to assist in identifying entities or plots;
• Further Evaluation.
• Import specific domain vocabularies and Wordnet.

VIST (Microsoft, 2016)    AVA (Google, 2017)
Thank you!