C-Drag-Official-Repo

C-Drag: Chain-of-Thought Driven Motion Controller for Video Generation

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arXiv Paper

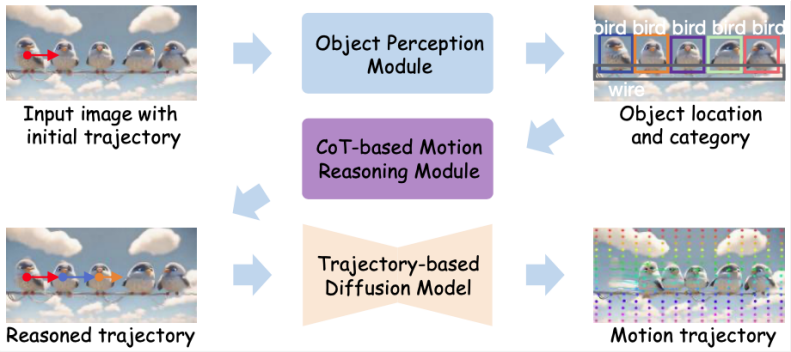
Latest

- 2025/02/12: We released our code and benchmark.
- 2025/02/12: We released our technical report on arxiv. Our code and models are coming soon!

▸ Abstract

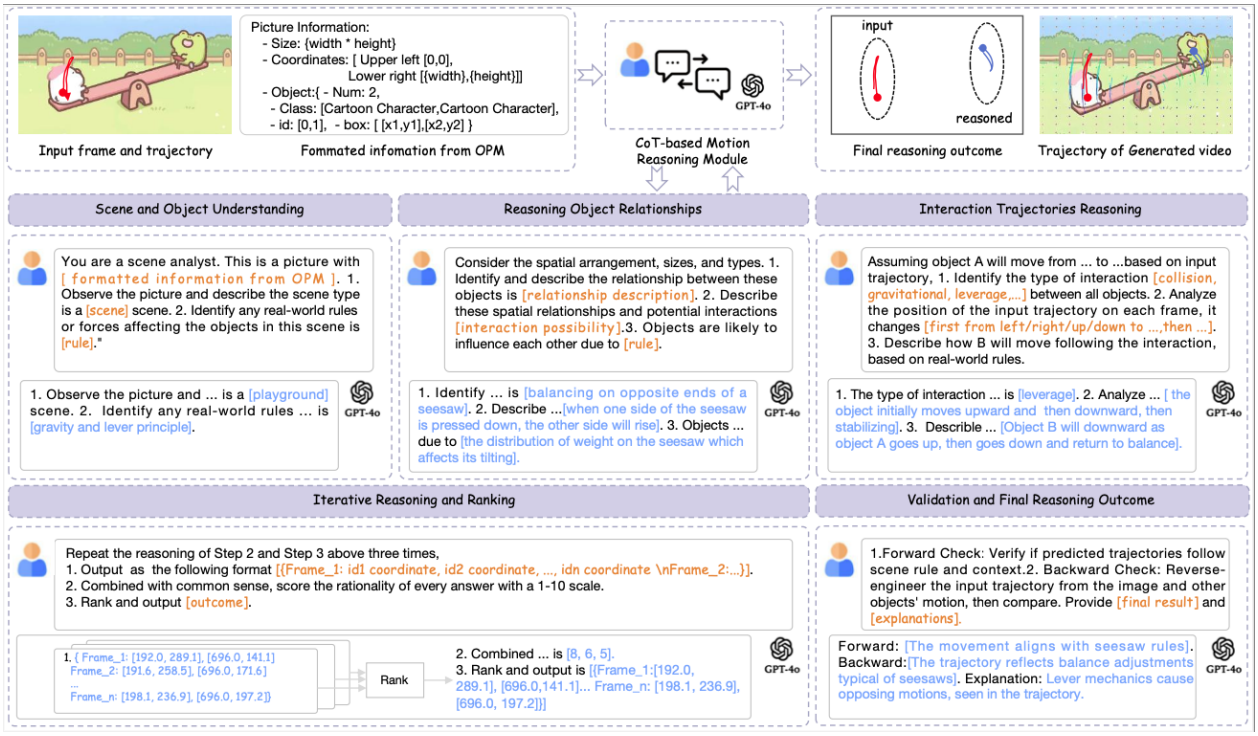
Intro

- **C-Drag** first takes a single RGB image and one or more drag motion trajectories as input. We employ an object perception module to obtain information about all related objects in the image. Chain-of-Thought (CoT)-based reasoning module introduces a reasoning strategy to precisely reason motion trajectories of all objects according to the detected position and category information. With the generated object trajectories, we use a pre-trained trajectory-based generation model to generate the videos with multiple-object interactions.



- **CoT-based Motion Reasoning Module** An illustrative view of CoT-based Motion Reasoning Module which undergoes a five-stage reasoning process. **Scene and Object Understanding**, where a pre-trained visual language model (VLM) interprets the scene and establishes motion rules using formated information from Object Perspection Module. In **Reasoning Object Relationship**, the VLM identifies spatial relationships and potential interactions among objects to inform trajectory predictions. **Interaction Trajectories Reasoning** follows, categorizing interactions (e.g., collisions, forces) and predicting affected object paths. During **Iterative**

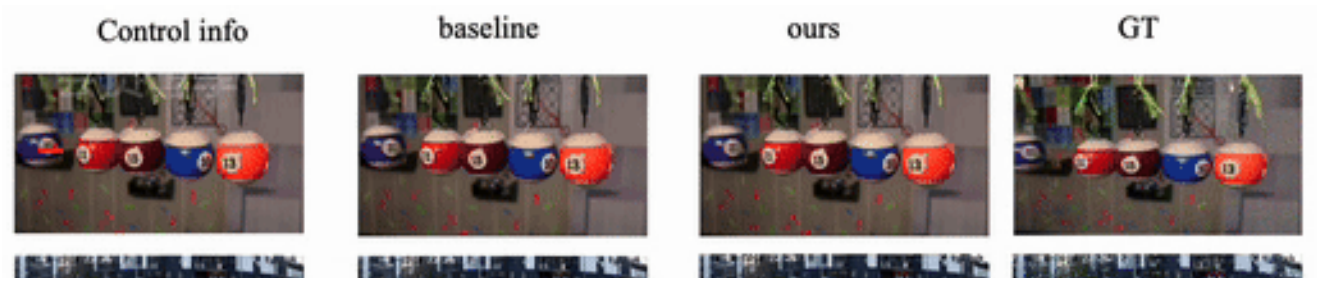
Reasoning and Ranking, initial predictions are iteratively optimized, with the VLM selecting the most consistent motion sequences. Finally, in **Validation and Final Reasoning Outcome**, forward and backward validation ensures predicted trajectories align with scene rules, iterating until accuracy is achieved.

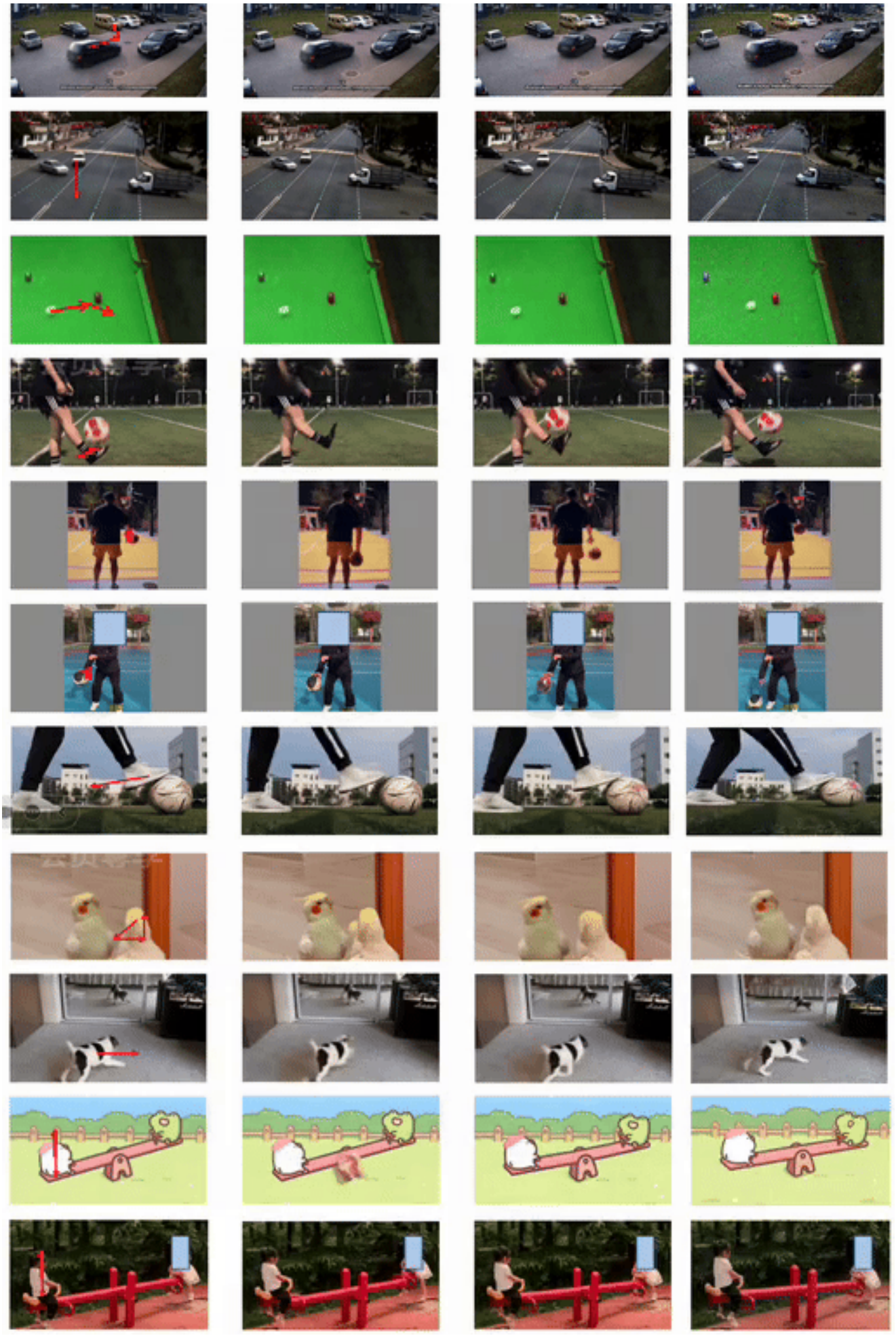


- We propose a new VOI dataset. This dataset has 72 videos and contains three typical types of object interactions, including *collision and chain reaction*, *gravity and force*, and *levers and mirrors*. We counted the number of videos, annotated boxes, and the objects trajectories.

Category	Sub-category	Video	Anno Boxes	Anno Trajectories
Collision and Chain Reaction	Billiard	16	2160	198
	NewtonCradle	7	300	79
	Traffic	10	180	90
Gravity and Force	Basketball	6	1080	34
	FootBall	7	960	76
Levers and Mirrors	Seesaw	15	840	145
	Mirror	11	1800	89
Total	-	72	7320	711

Visualization





Getting Start

Setting Environment

```
git clone https://github.com/WesLee88524/C-Drag-Official-Repo.git
cd C-Drag-Official-Repo

conda create -n C-Drag python=3.8
conda activate C-Drag
pip install -r environment.txt
```

Download Pretrained Weights

Download the Pretrained Weights to `models/` directory or directly run `bash models/Download.sh`.

Drag and Animate!

```
python demo.py
```

It will launch a gradio demo, and you can drag an image and animate it!

Citation

if you use our work, please consider citing us:

```
@misc{li2024multigranularity,
      title={Multi-Granularity Language-Guided Multi-Object Tracking},
      author={Yuhao Li and Muzammal Naseer and Jiale Cao and Yu Zhu and
Jinqiu Sun and Yanning Zhang and Fahad Shahbaz Khan},
      year={2024},
      eprint={2406.04844},
      archivePrefix={arXiv},
      primaryClass={cs.CV}
}
```

License

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Acknowledgement

We appreciate the open source of the following projects:
DragNUWA, DragAnything;