Project 2

Description

You should implement a system that recognizes the state of gameplay from the clips in the selected board game. The program should track the movement of counters, dice, cards and detect events on the video.
The task is also to prepare the appropriate input data (your own video recording).

The input data should be divided into 3 groups depending on the difficulty for example:

- **easy**: perfect view, the game elements are not covered with your hands when carrying it...
- **medium**: different dynamics of light in the picture, shadows, light reflections...
- **difficult**: same as the medium and angled view (a few or several degrees), game components partially covered with hands when moving, slight shaking of the camera...

Each data group should have at least 3 representative clips per difficulty (9 clips in total) length should not be less than 1 min, max 5 min per clip.

The selected game may be a real board game or some extension of it. It cannot be a computer game, although computer simulations can be used to test solutions or to train ML models. The game does not have to be original; it can be self-printed or hand-drawn. The final 9 clips must be recorded by you, it cannot be a video from the Internet or a computer simulation.

Typical card games such as poker, macau, bridge, memory … that contain only cards are insufficient and must be extended with some additional elements that should be consulted.
Examples of games:

- Catan,
- Monopoly,
- Super farmer,
- Man, Don't Get Angry,
- Ticket to Ride,
- Chess.

Easier to process are games that contain different colored pieces, cards, dice, etc. than those games that contain only one or 2 colors of pawns (chess).

Don’t use neural networks.

Milestones

1. Until the end of the week (15.12.2024), the e-mail containing:
    - team members
    - selected board game
    - a short description of the game (maximum one paragraph, if it's not a very popular game then there might be a link to this game)
    - list of in-game items (at least 3) e.g. counters, dice, cards and what are their types or numbers, boards, figures, tiles, tokens, boxes for tokens …

- description of at least 5 events occurring in the game. Event may be:
    - roll the dice and read the result,
    - play a card,
    - card reveal,
    - moving a pawn / counter (from a given position to a new position)
    - placing a token / a new counter / construction of a building
    - taking a resource
    - starting the game
    - end of the game
    - Events such as playing a green card and playing a red card are counted as the same event, as is the movement of pawn A from square 1 and the movement of pawn B from square 2.

2. 8.01.2024 23.59 **report** (.pdf or .html) **+ code + data** (it can be put e.g. on google drive but code and report should be downloadable without data)
3. 8.01.2024 **live presentation in front of the group (max 5 min)**

Failure to complete a milestone over time -0.5 grade.

Requirements

(will depend on the selected game)

3.0:

- preparation of a data set,
- preparation and presentation of the results (e.g. a game video with information about true events - described below)
- detection of at least 2 elements of the game: counter, dice, card, figure…. The positions of the game pieces cannot be hard-coded, but can, for example, be calculated from the coordinates of the board found.
- tracking movement of some (at least 1) element of game: counters, dices, cards in the movie
- a **report** containing:
    - Informations from milestone 1,
    - description of the data set, with a few image examples,
    - description of the used techniques along with the intermediate results for each processing step of the example frame,
    - the effectiveness for each dataset,
    - analysis and conclusions of the obtained results,
    - potential references to literature.

4.0:

- requirements for 3.0 and:
- detection of at least 2 selected events in the movie, and written out the corresponding message on the screen

5.0:

- requirements for 4.0 and:
- game status detection (the player's current state of possession, positions of pawns, card, game pieces
- detection of at least 5 selected events

- track gameplay score