Self-Trained Image-to-HTML Convertor

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Automatic HTML Code Generation

- Front-end web development:

  Time consuming and skill-based

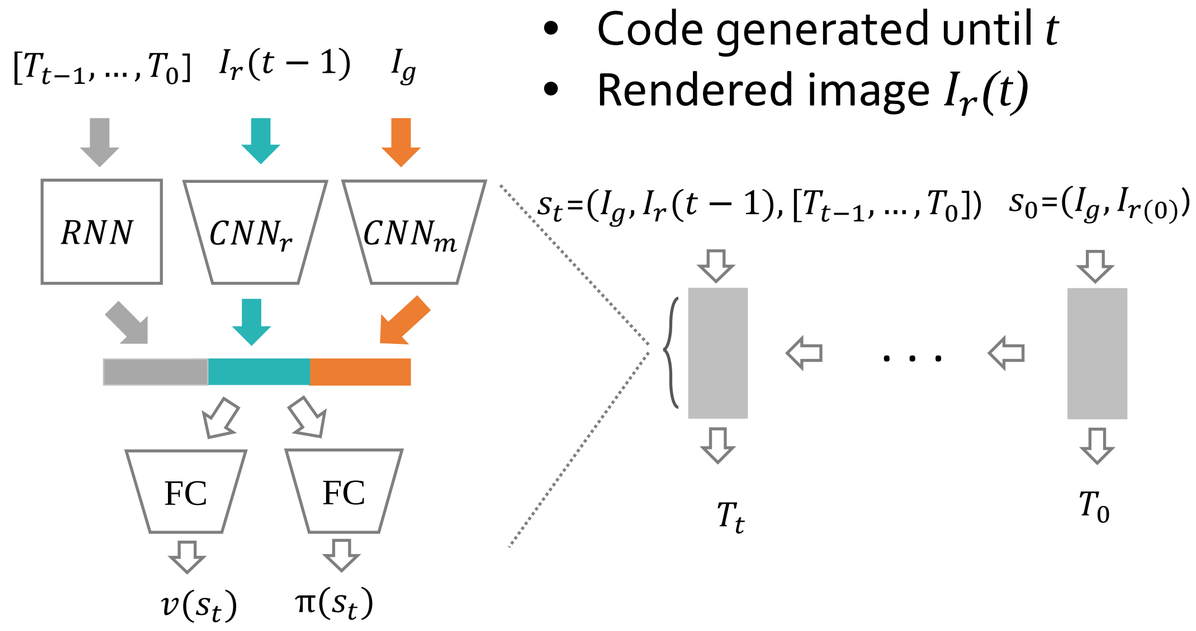
  → Can we use machine learning techniques?

- Most methods require **ground-truth programs**:
  - Variant algorithms, variable names, etc.
  - Model learns to generate programs similar to the training set
  - Supervised RNN-based methods ignore inconsistency between training and testing [1]

- **Reinforcement learning for code generation**
  - Supervision directed by a reward signal.
  - Generating programs of desired characteristics.

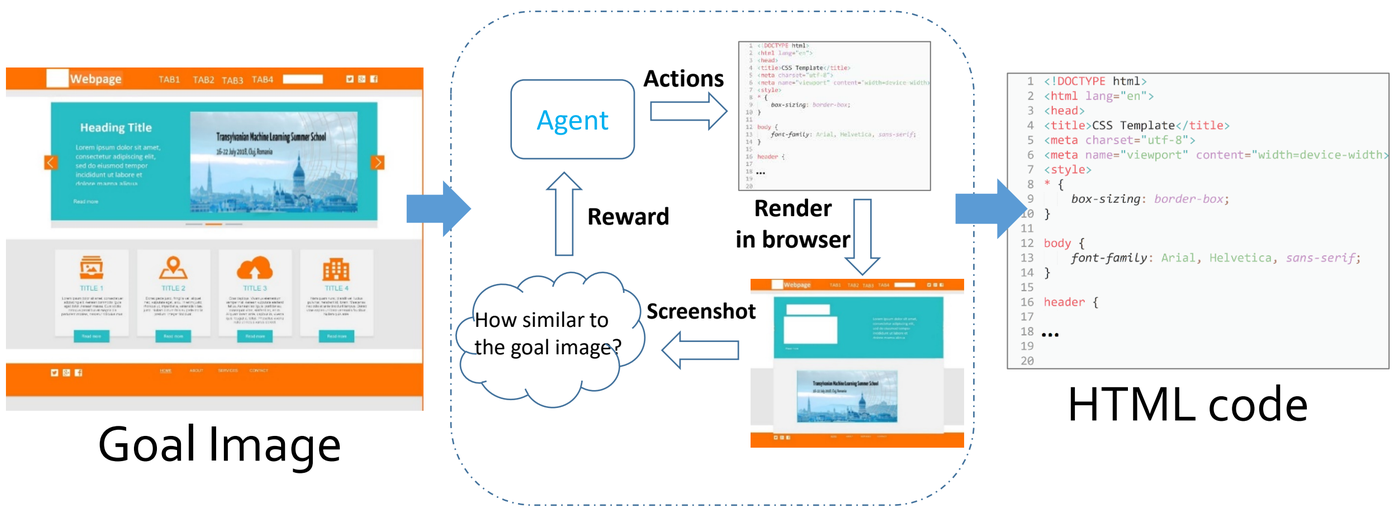
Model Architecture

- Actions : Set of all possible tokens
- State at time t :
  - Goal image I_g
  - Code generated until t
  - Rendered image $I_r(t)$



- Policy and value networks are trained by (MCTS) [2]

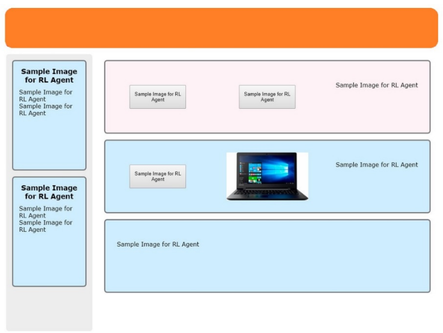
Proposed Approach



- Generator is an RL agent, which:
- **Training**
  - Writes a code based on its current policy,
  - Checks to see if the code gives the desired result,
  - Modifies its policy accordingly.
- **Testing**
  - Generates code by running the policy network.
  - Can continue searching.
- **Reward:** Comparison of rendered and goal images

Database

- DSL:
  - 18 tokens
  - 35-token-length codes



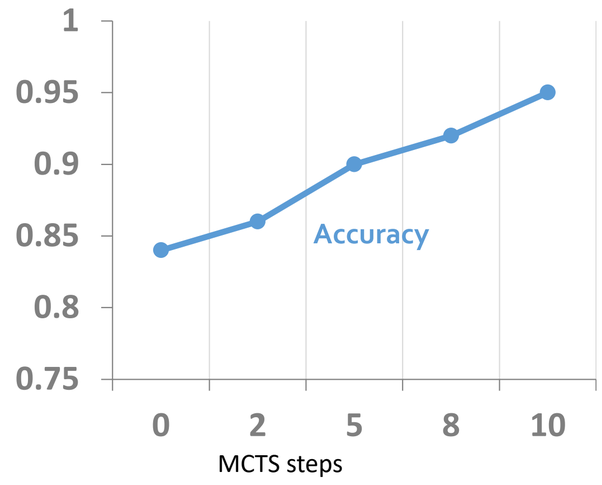
# of total web pages	Training size	Testing size
10M	4000	400

```
    header
left_column
{
    column_item-blue_bg
    {
        col_item_title
        col_item_text
        col_item_text
    }
    column_item-blue_bg
    {
        col_item_title
        col_item_text
        col_item_text
    }
}
right_grid
{
    grid_row-yellow_bg
    {
        grid_item_button
        grid_item_button
        grid_item_text
    }
    grid_row-blue_bg
    {
        grid_item_button
        grid_item_image
        grid_item_text
    }
    grid_row-blue_bg
    {
        grid_item_text
    }
```

Experiment

- Pre-training with supervised learning

Baseline (Supervised)	Proposed method
86%	95%



References

[1] Bahdanau, D., Brakel, P., et al. An actor-critic algorithm for sequence prediction, arXiv:1607.07086, 2016.

[2] Silver, D., Huang, A, et al. Mastering the game of go with deep neural networks and tree search. nature, 529(7587):484–489, 2016.

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