Let's Play Music: Audio-driven Performance Video Generation

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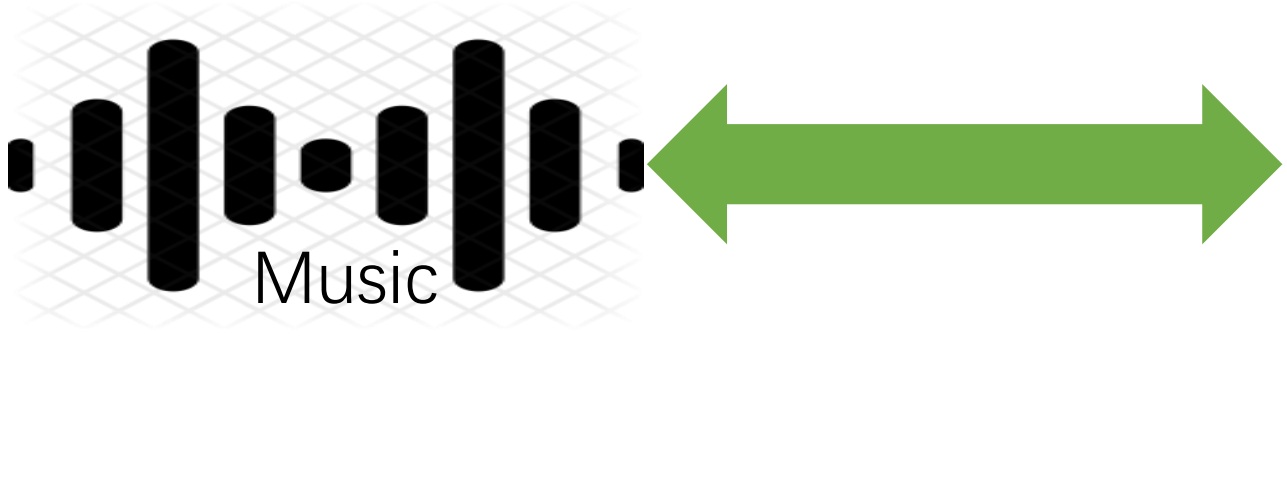
School of Artificial Intelligence, University of Chinese Academy of Sciences

ICPR 2020

Task Definition

- There is a clear relationship between a piece of music and the movements performed.



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- How to construct the relationship between music and corresponding performance movements?

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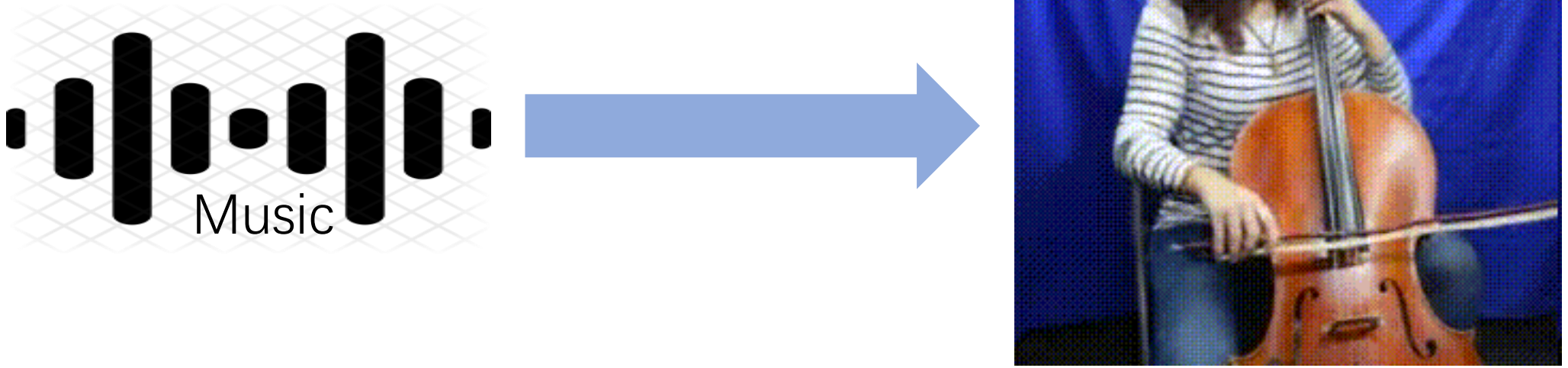
- **New Task: Audio-driven Performance Video Generation (APVG)**



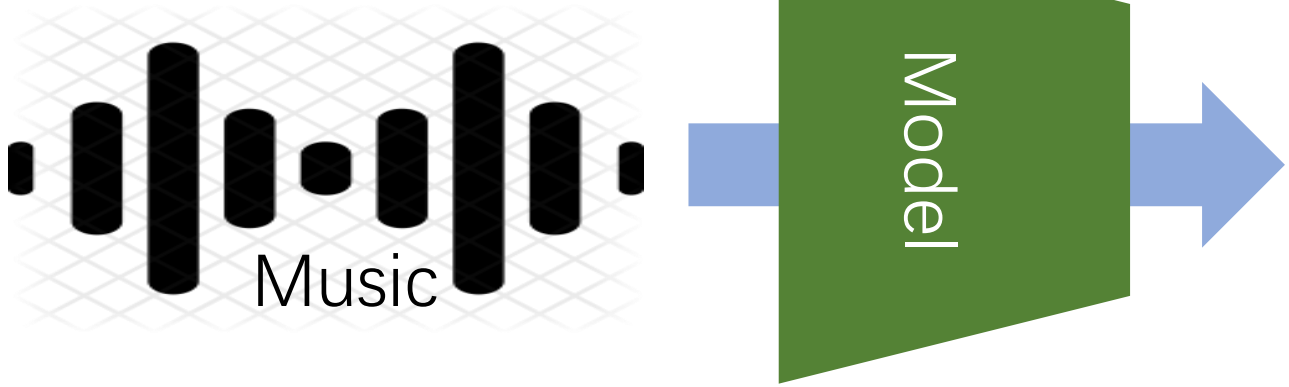
Task Definition

- How to construct the relationship between music and corresponding performance movements?
- New Task: Audio-driven Performance Video Generation (APVG)
- **Applications: Concert video generation, instrumental teaching**

Motivation

- Challenges:

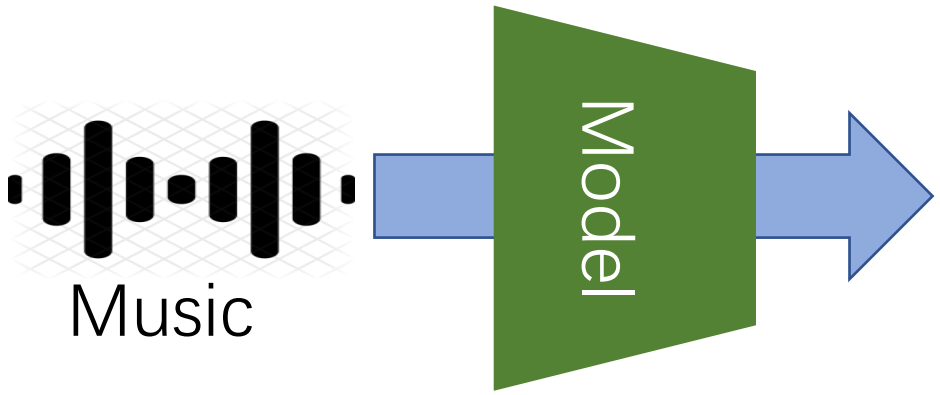
Generate **precise motion details** such as body and fingers from the **low-dimensional audio information**.



Motivation

Solutions:

- **Multi-stage generation**
- Structure and temporal information



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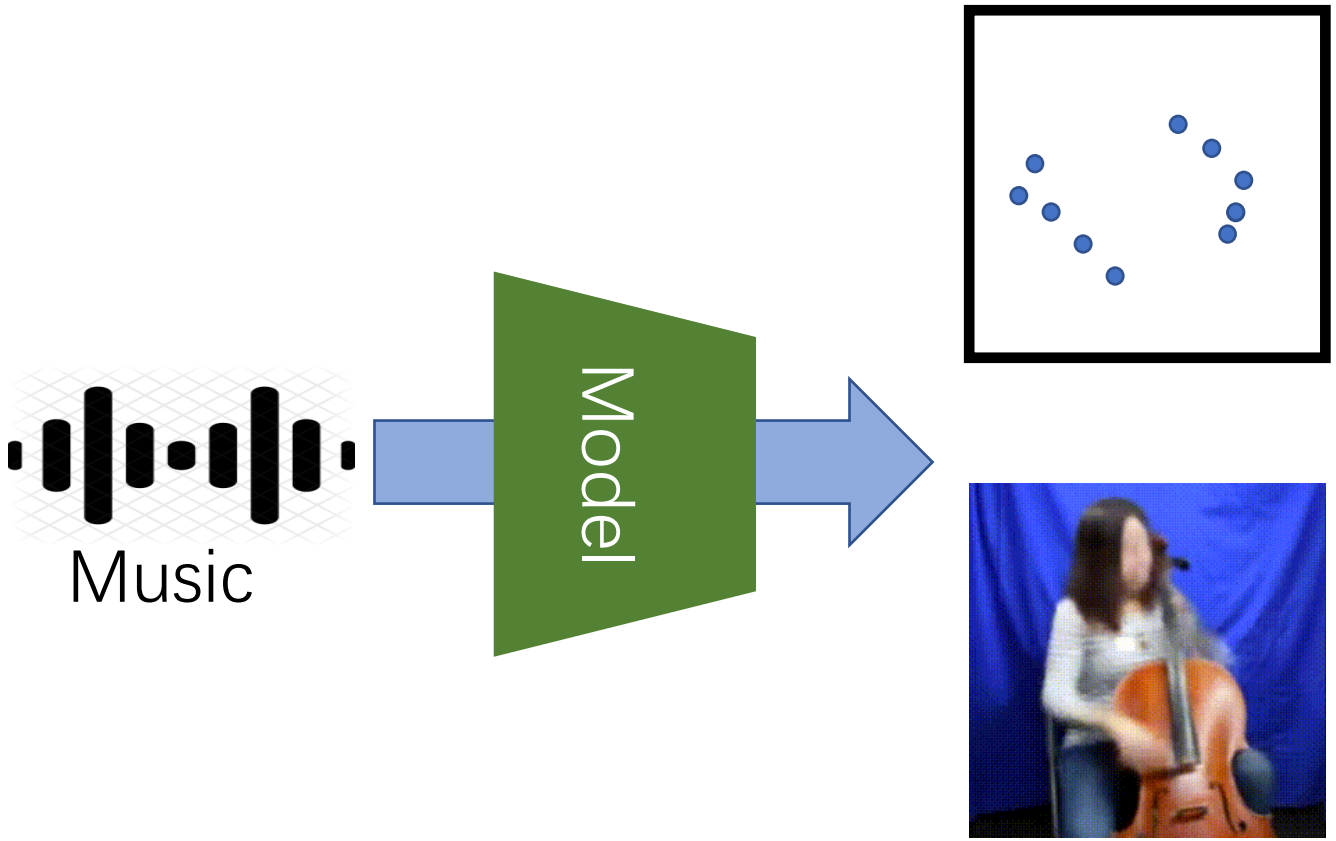

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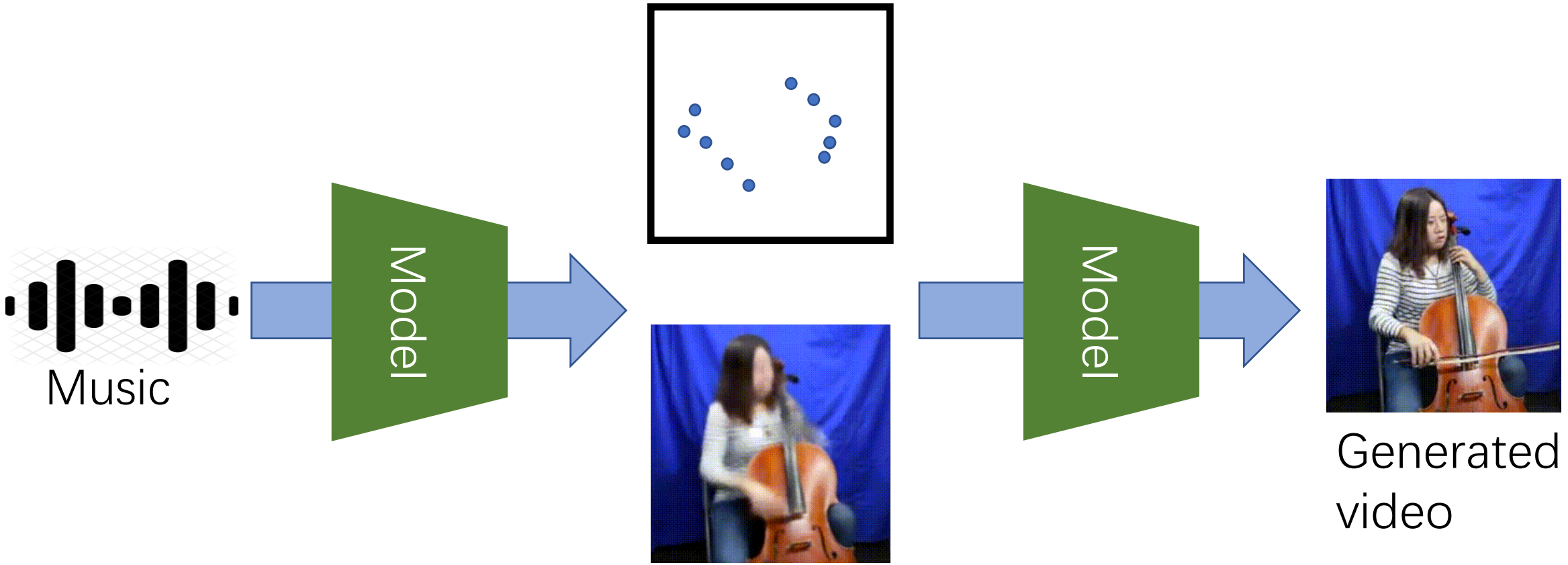

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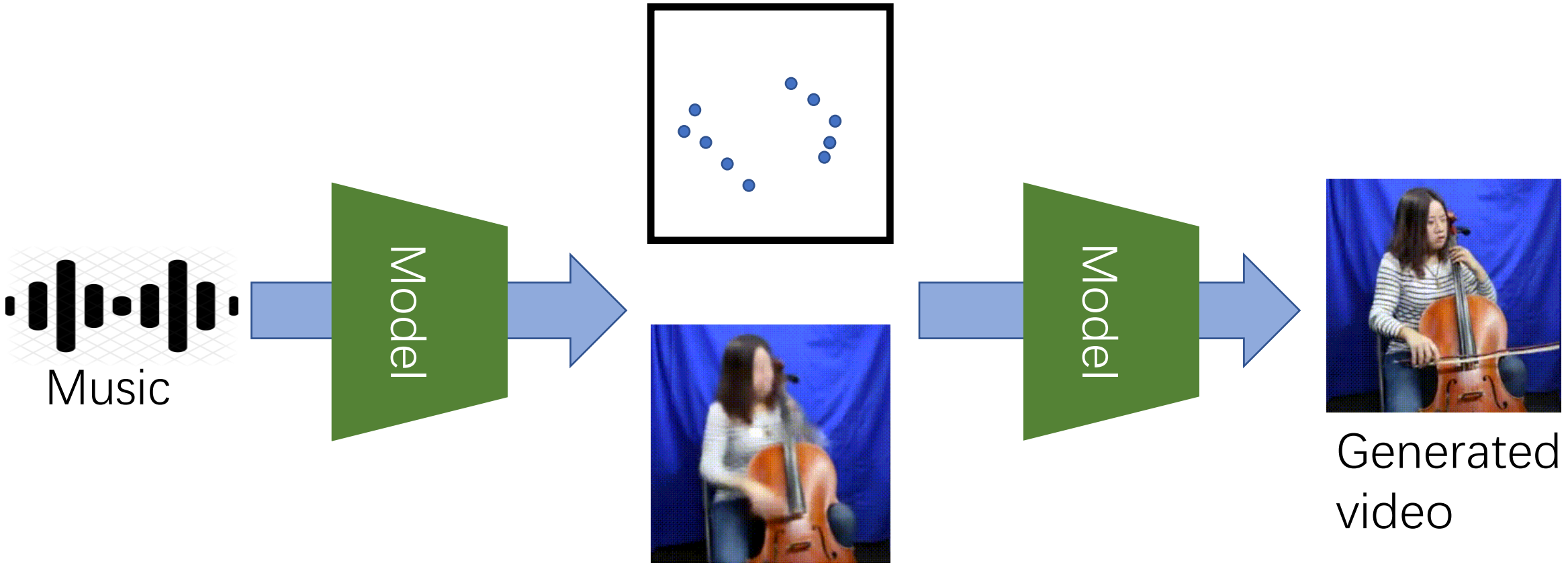

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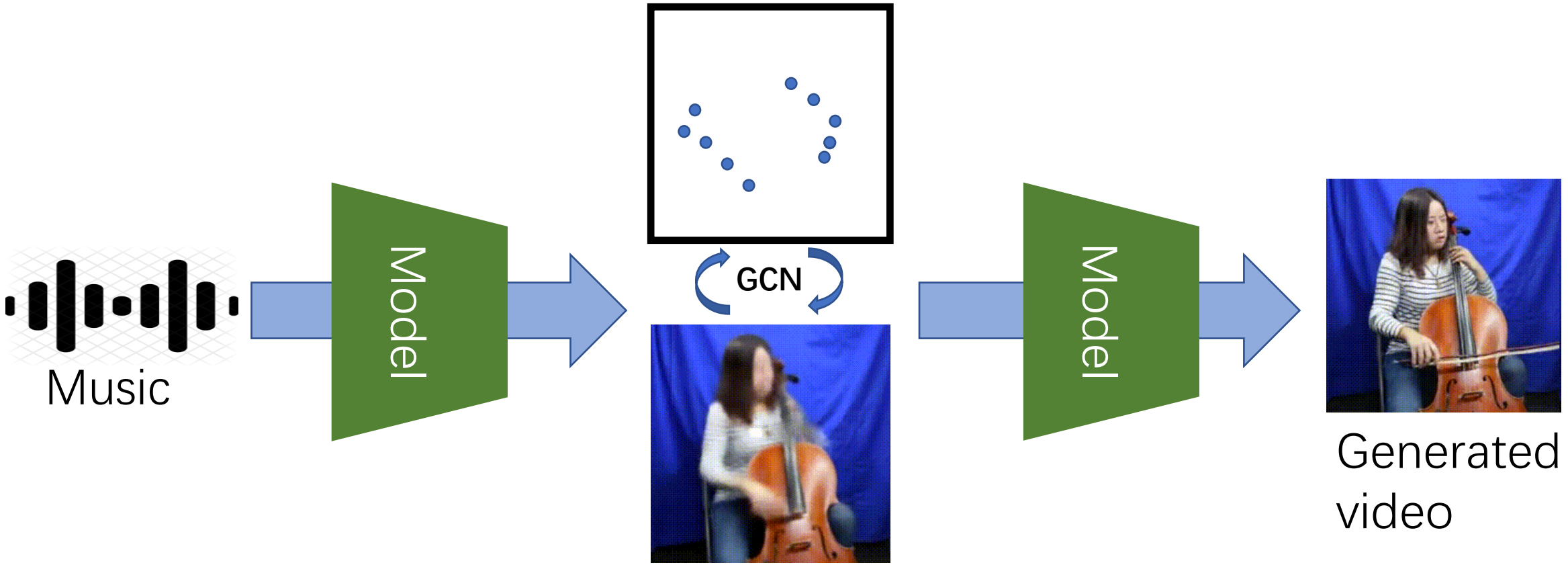

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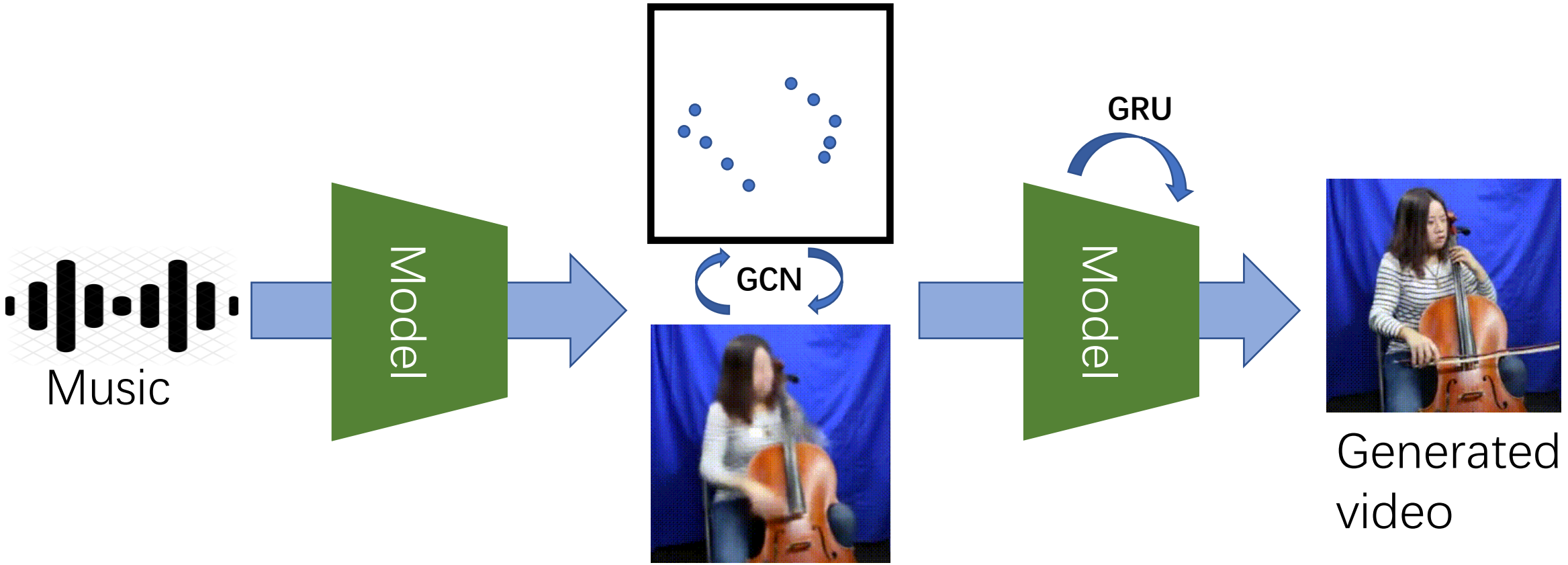
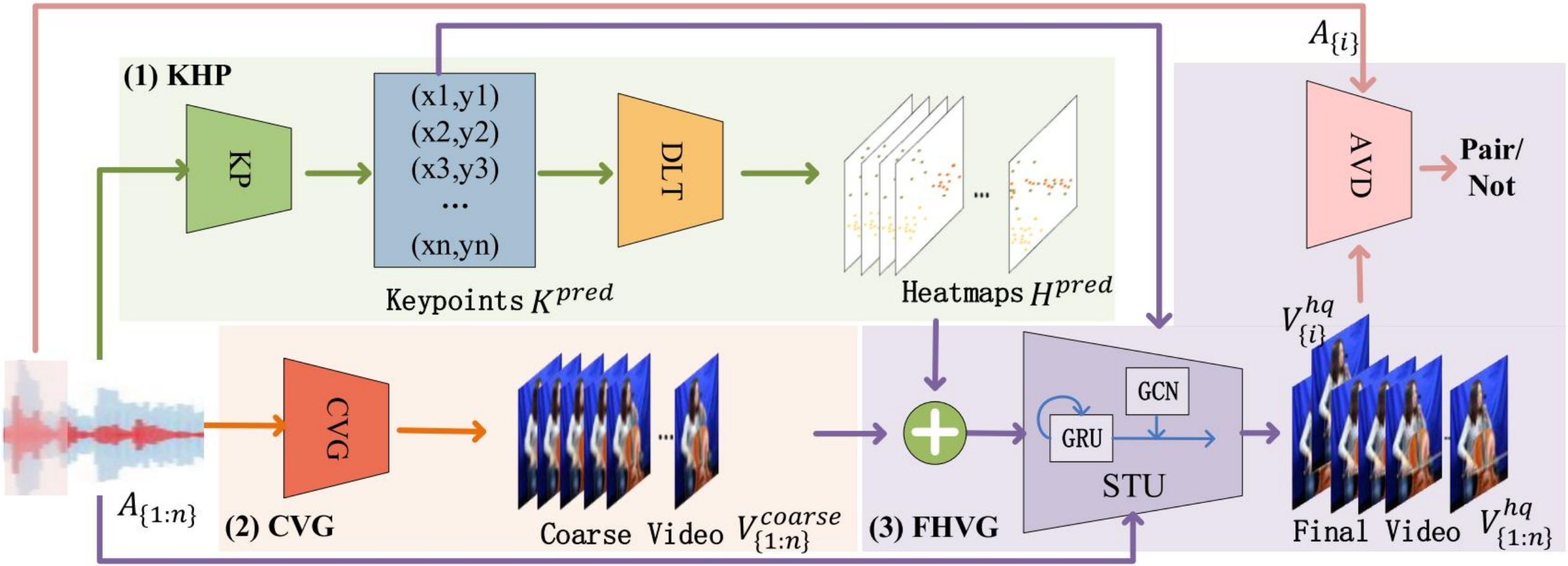


Approach


(1) KHP
KP
(x1,y1)
(x2,y2)
(x3,y3)
...
(xn,yn)
DLT
Keypoints K^{pred}
Heatmaps H^{pred}
$A_{\{i\}}$
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$V^{hq}_{\{i\}}$
$A_{\{1:n\}}$
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(2) CVG
Coarse Video $V^{coarse}_{\{1:n\}}$
(3) FHVG
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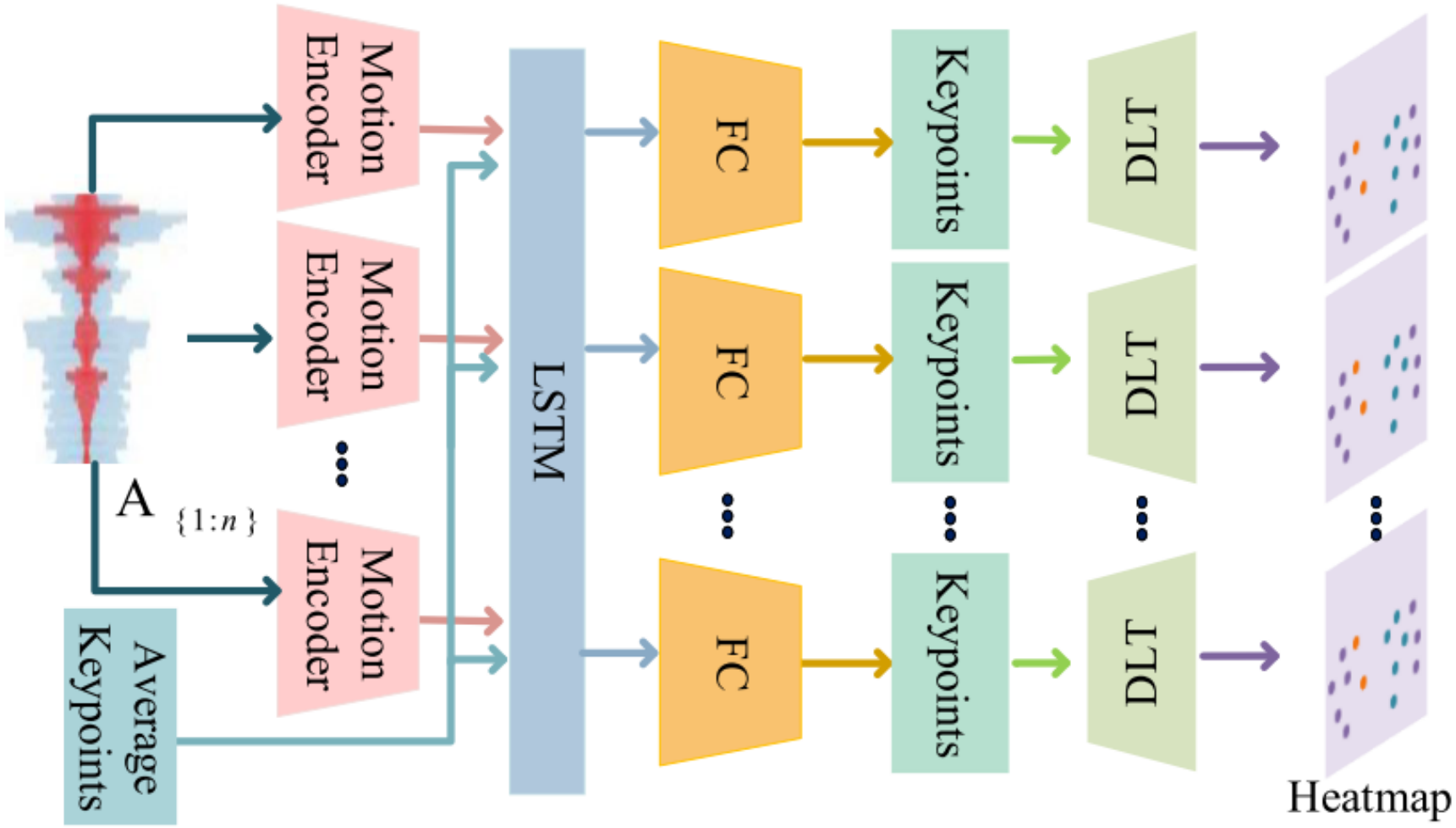
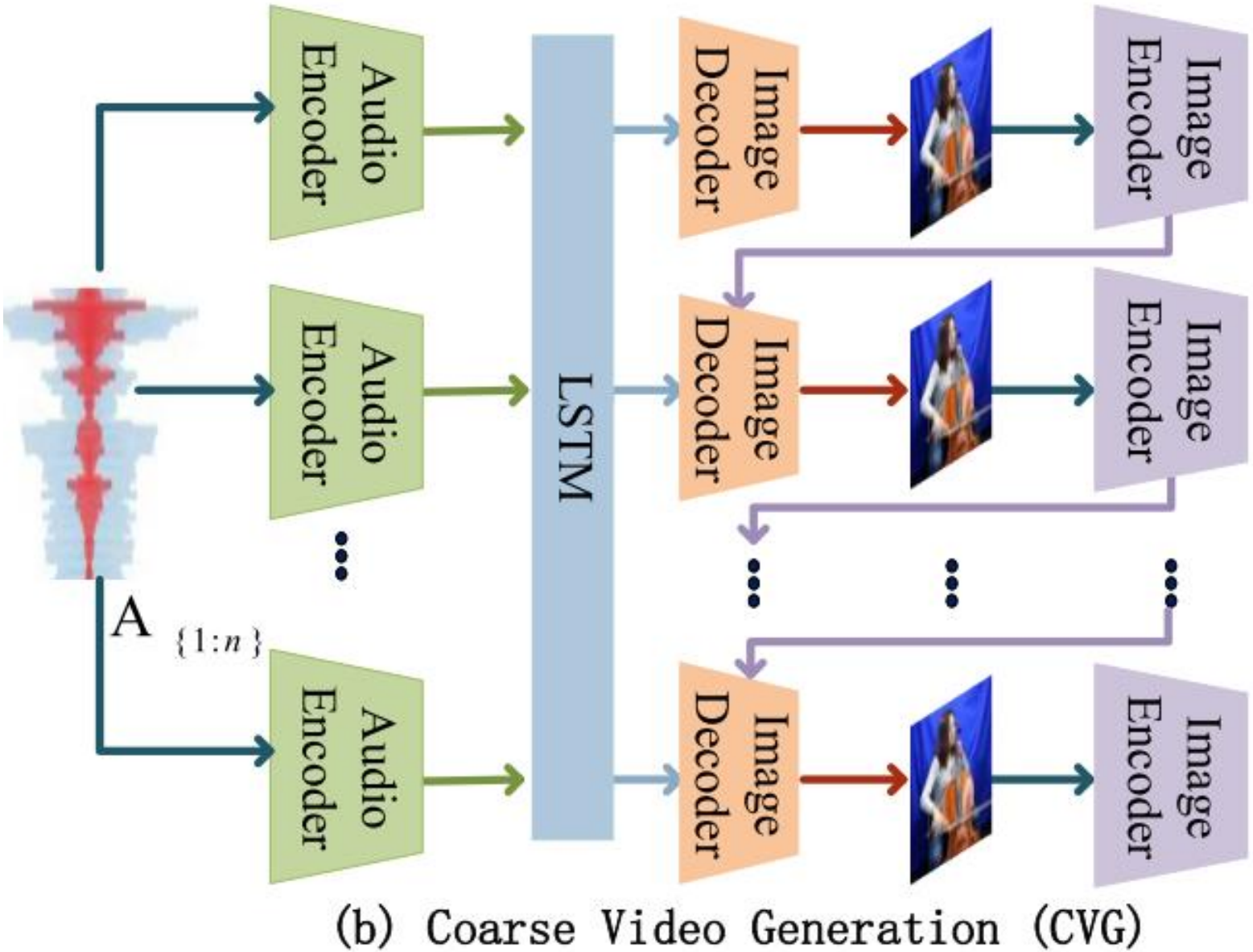
Final Video $V^{hq}_{\{1:n\}}$

Approach



(a) Keypoint and Heatmap Prediction (KHP)

Approach


Audio Encoder
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Audio Encoder
A {1:n}
LSTM
Image Decoder
Image Decoder
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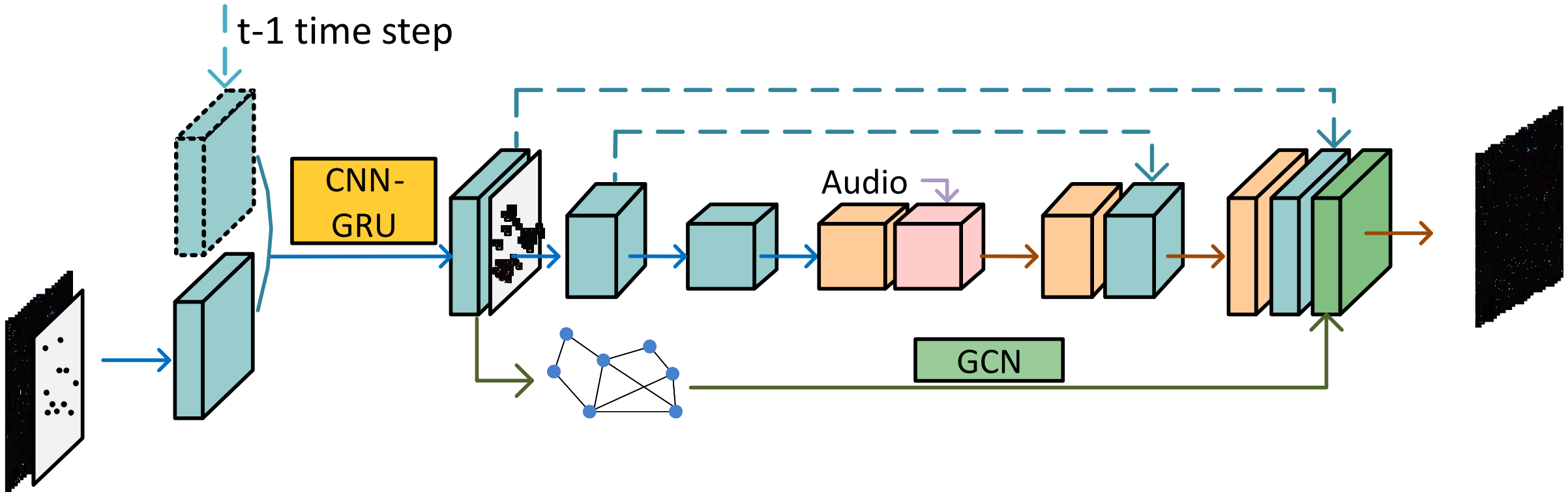
Image Encoder
Image Encoder
Image Encoder
(b) Coarse Video Generation (CVG)

Approach



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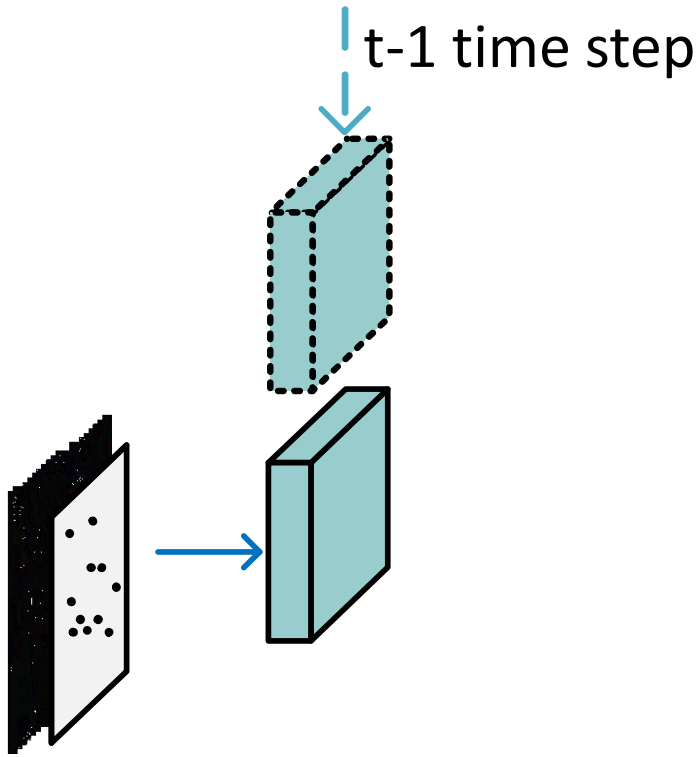

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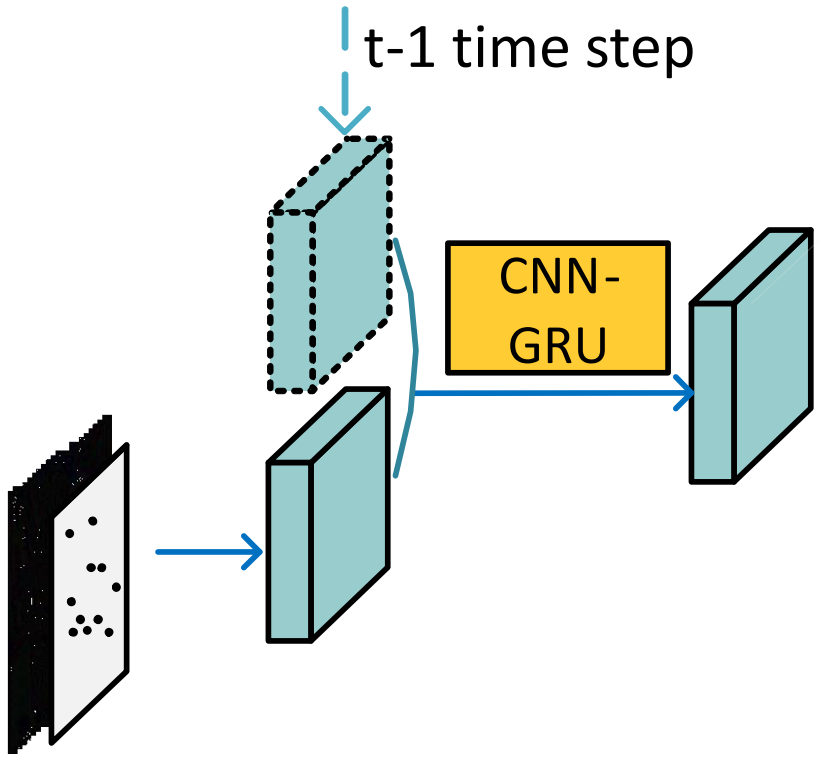

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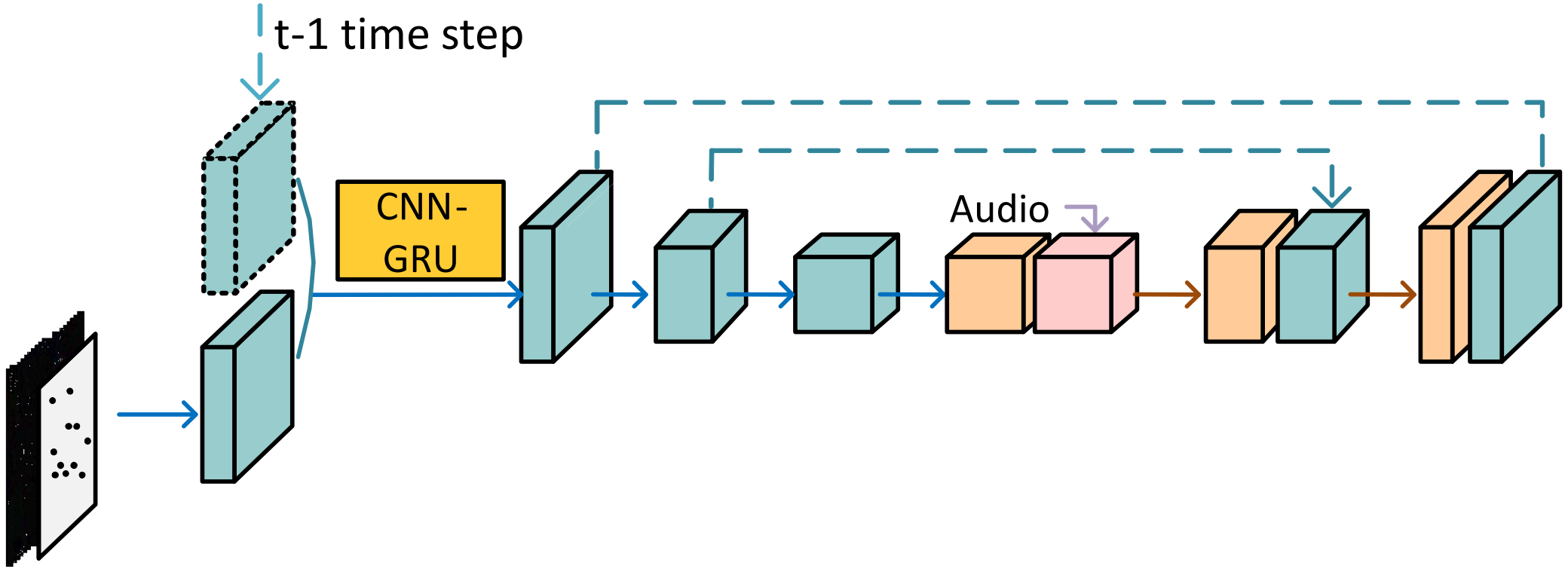

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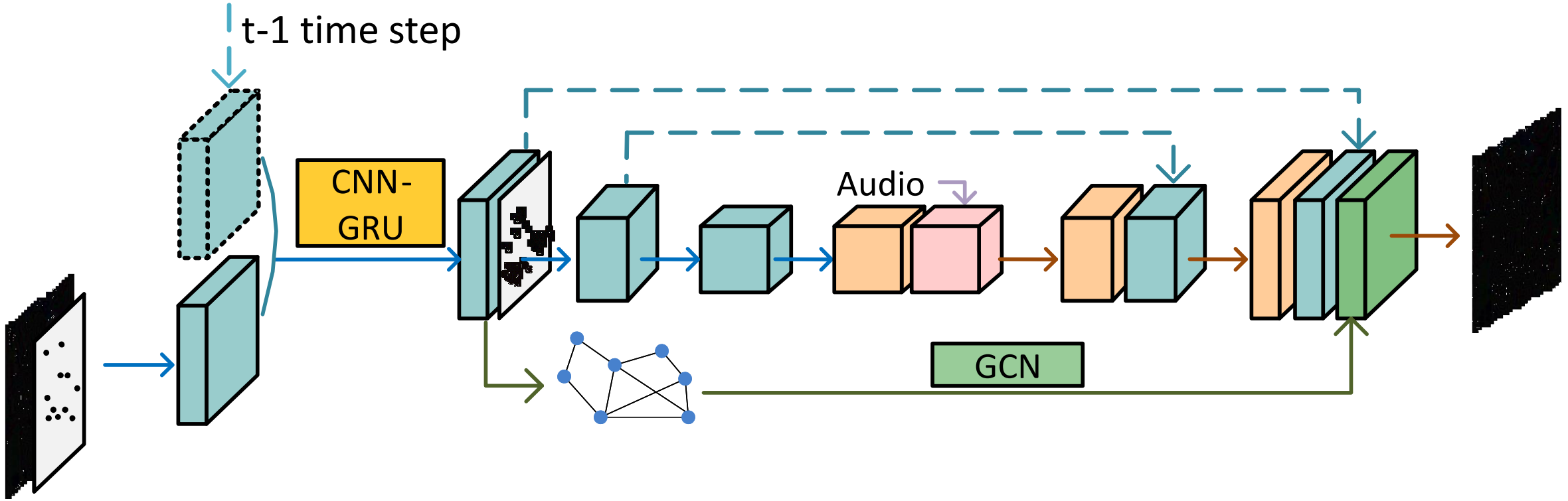

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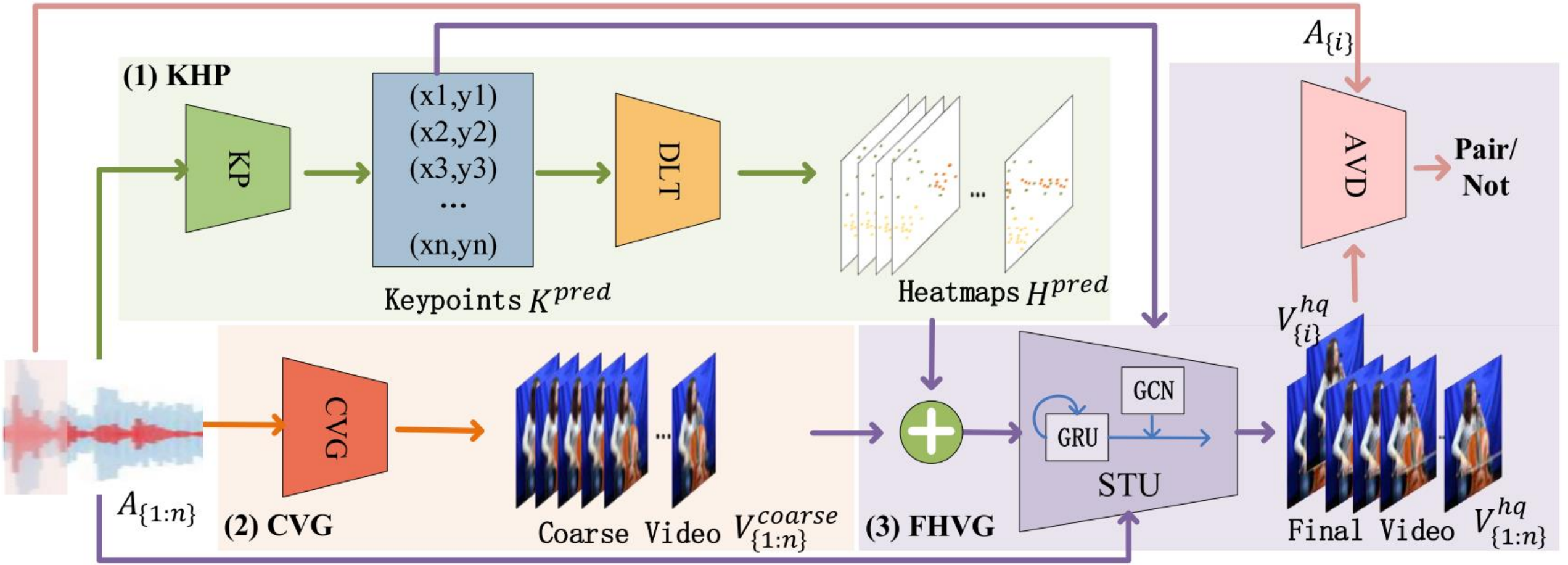
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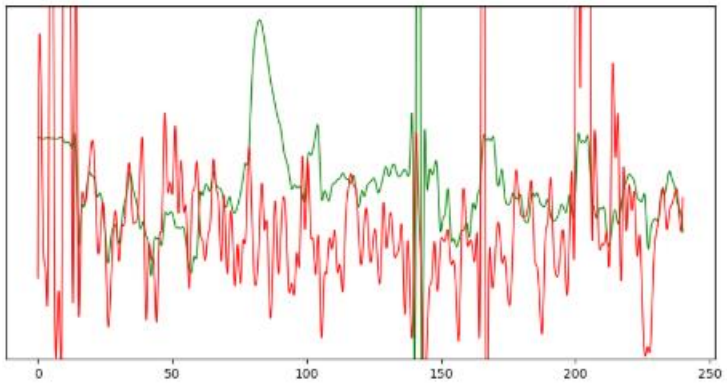
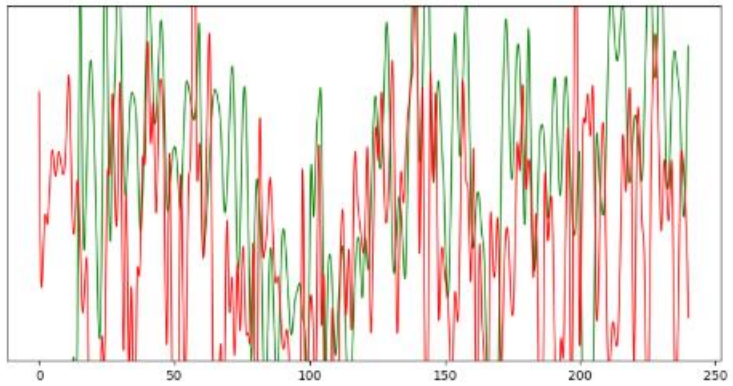
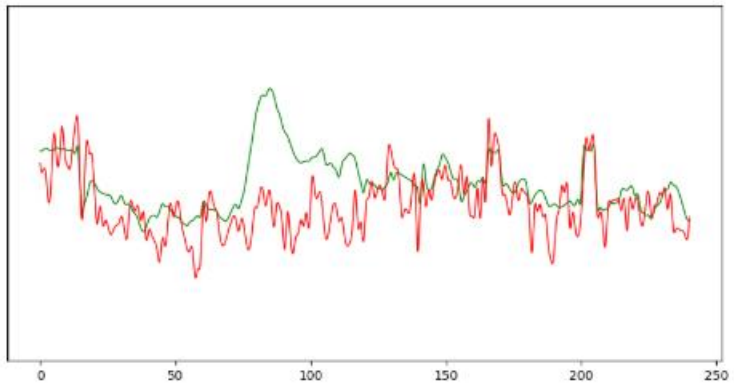
Experiments



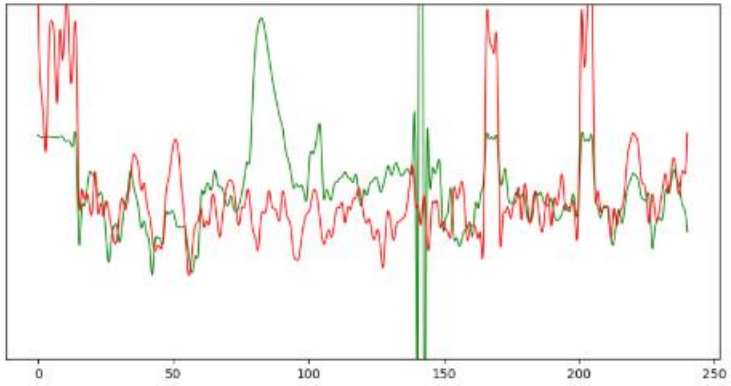
(a) Baseline: left hand



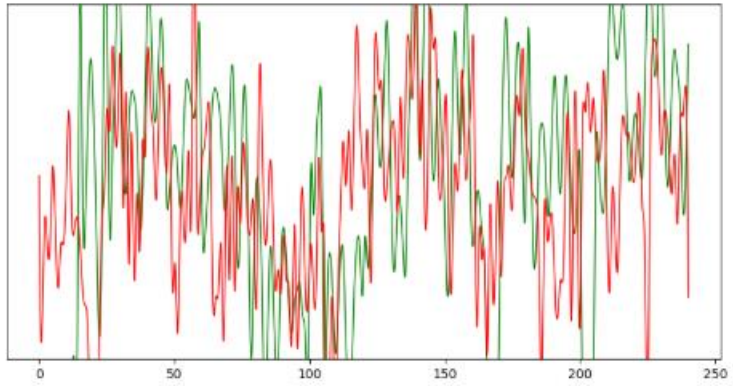
(b) Baseline: right hand



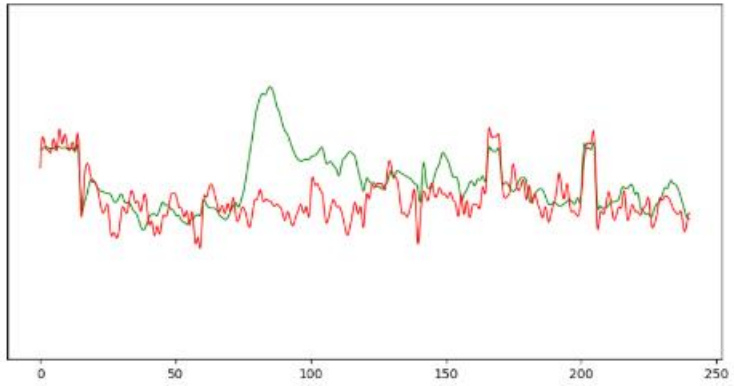
(c) Baseline: body



(d) Ours: left hand



(e) Ours: right hand



(f) Ours: body

Thanks for watching