EMO: Emote Portrait Alive

汇报人：项一卓

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Reference Image
Generated
Video

EMO

标题：EMO: Emote Portrait Alive – Generating Expressive Portrait Videos with Audio2Video Diffusion Model under Weak Conditions

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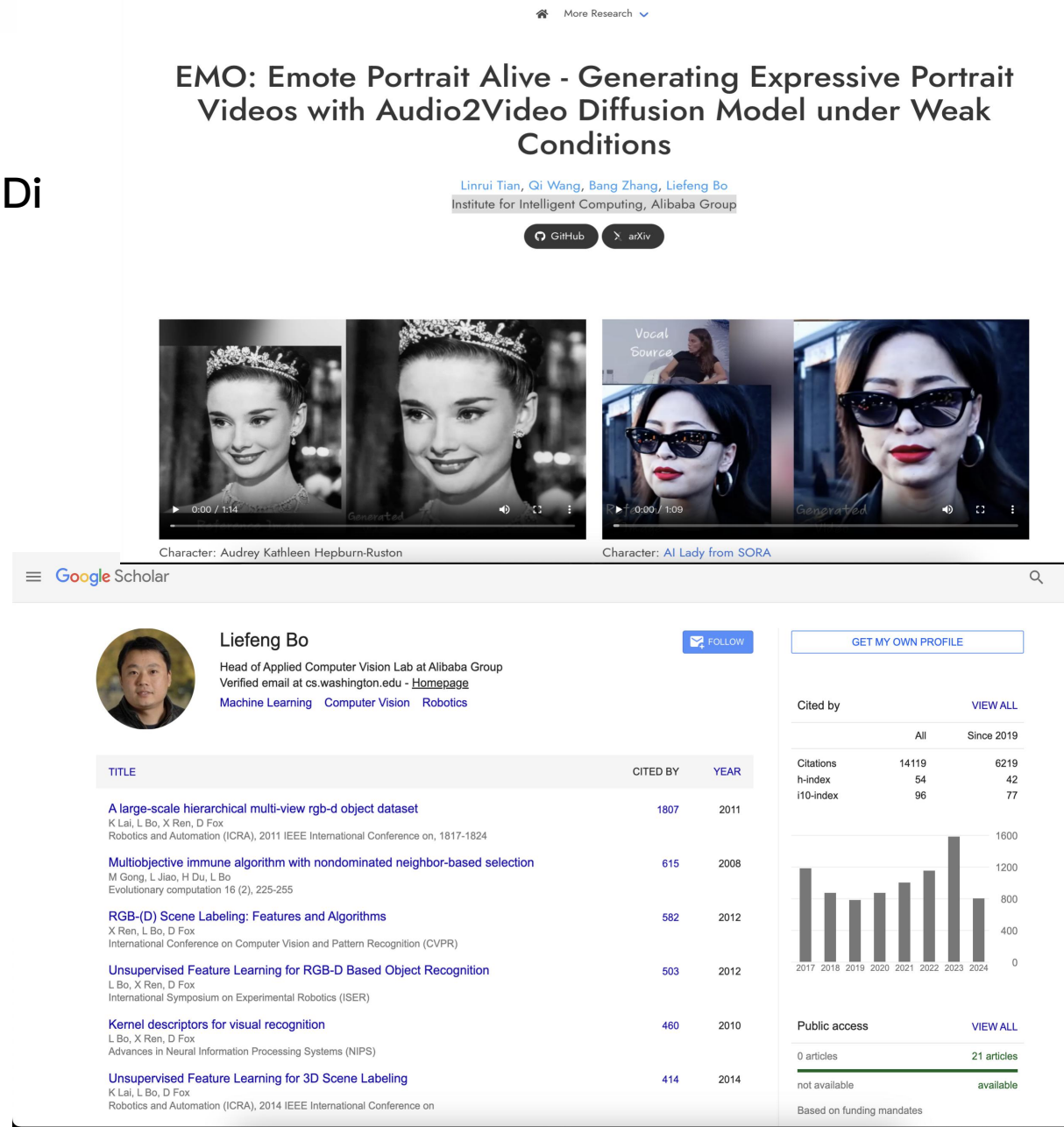
项目地址：https://humanaigc.github.io/emote-portrait-alive/

GitHub：https://github.com/HumanAIGC/EMO (7.5k)

被引：13



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01 模型简介

EMO – 网络结构

Backbone: SD 1.5 (Cross–Attn to Ref–Attn)

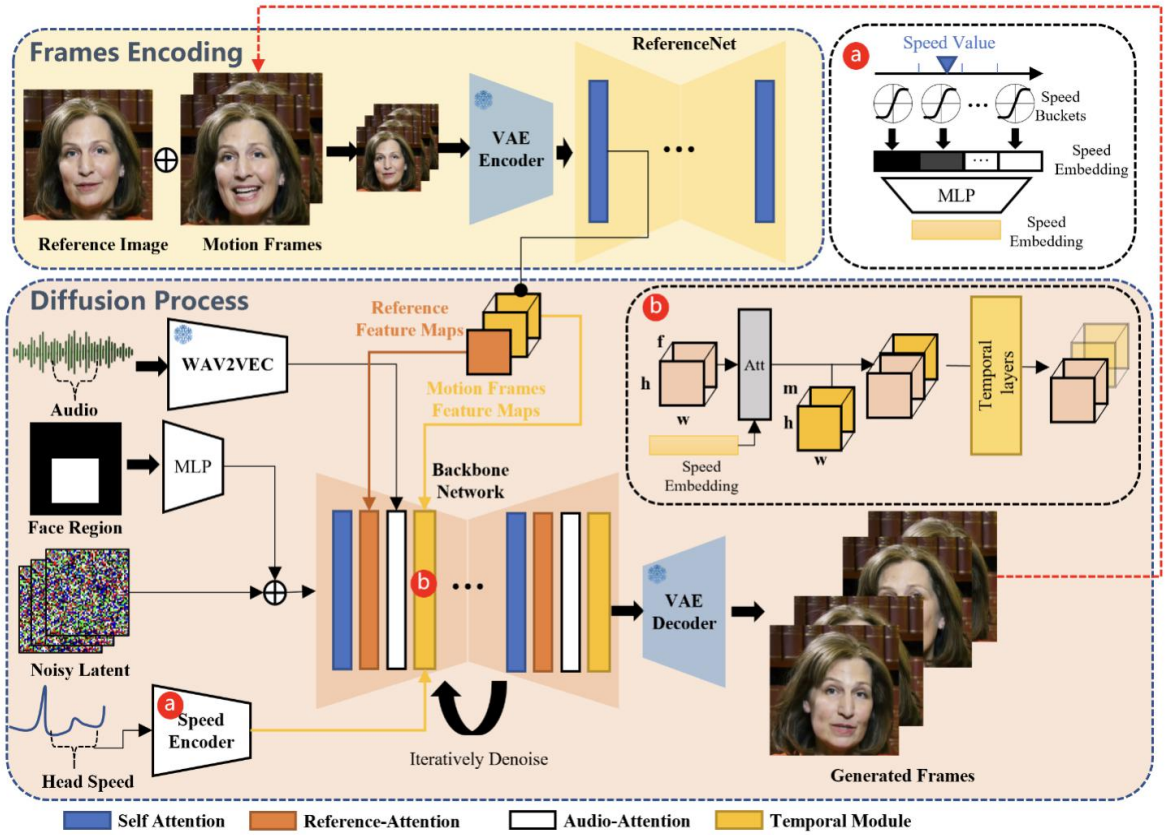
Audio: $A_{gen}^{(f)} = \oplus\{A^{(f-m)}, ...A^{(f)}, ...A^{(f+m)}\}$

ReferenceNet: SD 1.5

Temporal: AnimateDiff (add Motion Frames Feature Maps)

Face Locator: Conv Layers

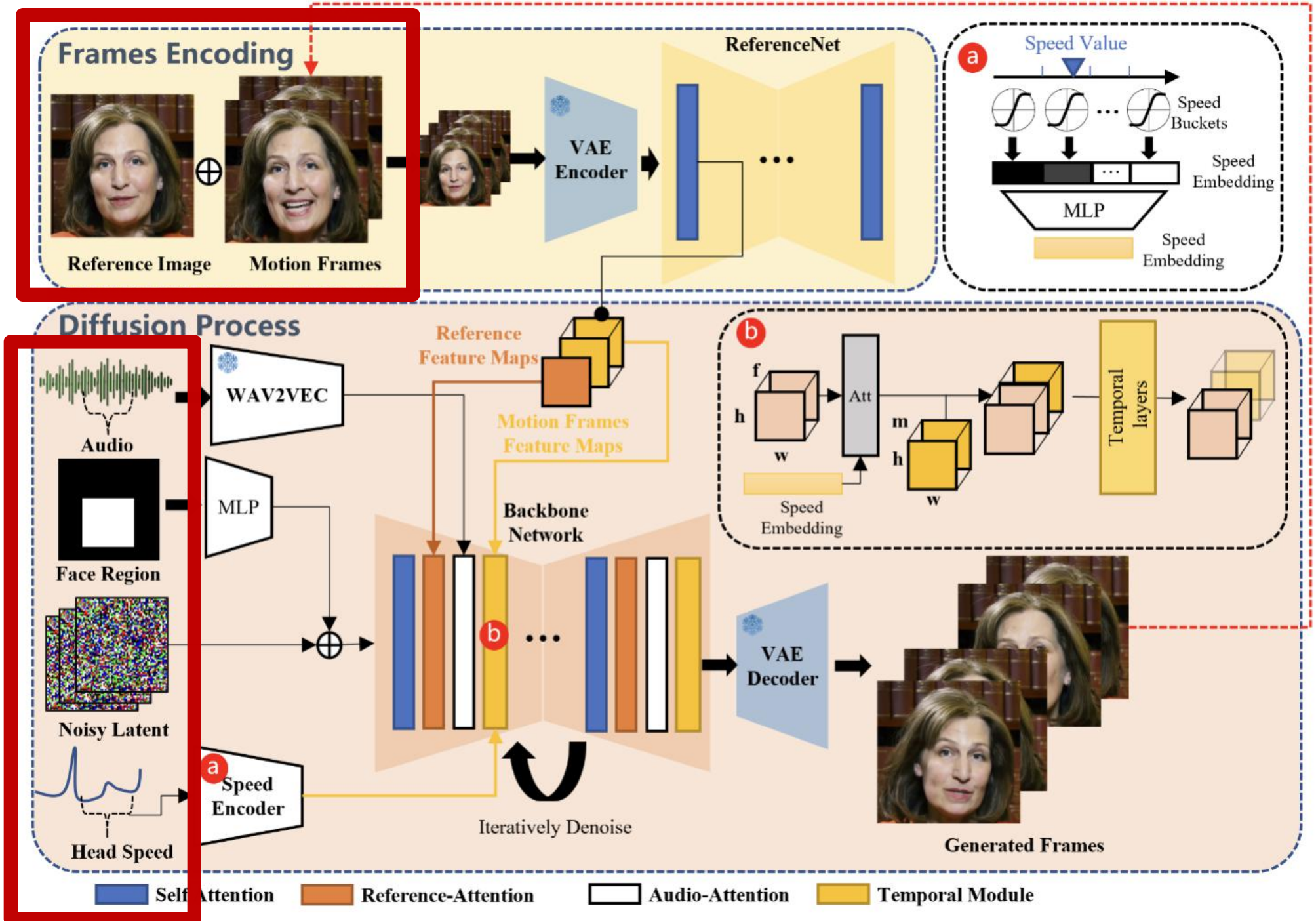
Speed Encoder: MLP + Cross–Attn



To address this issue, we incorporate the target head motion speed into the generation. More precisely, we consider the head rotation velocity w^f in frame f and divide the range of speeds into d discrete speed buckets, each representing a different velocity level. Each bucket has a central value c^d and a radius r^d. We retarget w^f to a vector $S = \{s^d\} \in \mathbb{R}^d$, where $s^d = \tanh((w^f - c^d)/r^d * 3)$. Similar to the method used in the audio layers, the head rotation speed embedding for each frame is given by $S^f = \oplus\{S^{(f-m)}, \ldots, S^{(f)}, \ldots, S^{(f+m)}\}$, and $S^f \in \mathbb{R}^{b \times f \times c^{speed}}$ is subsequently processed by an MLP to extract speed features.

02 输入与输出

- 图像
- 音频
- Face Region
- Head Speed

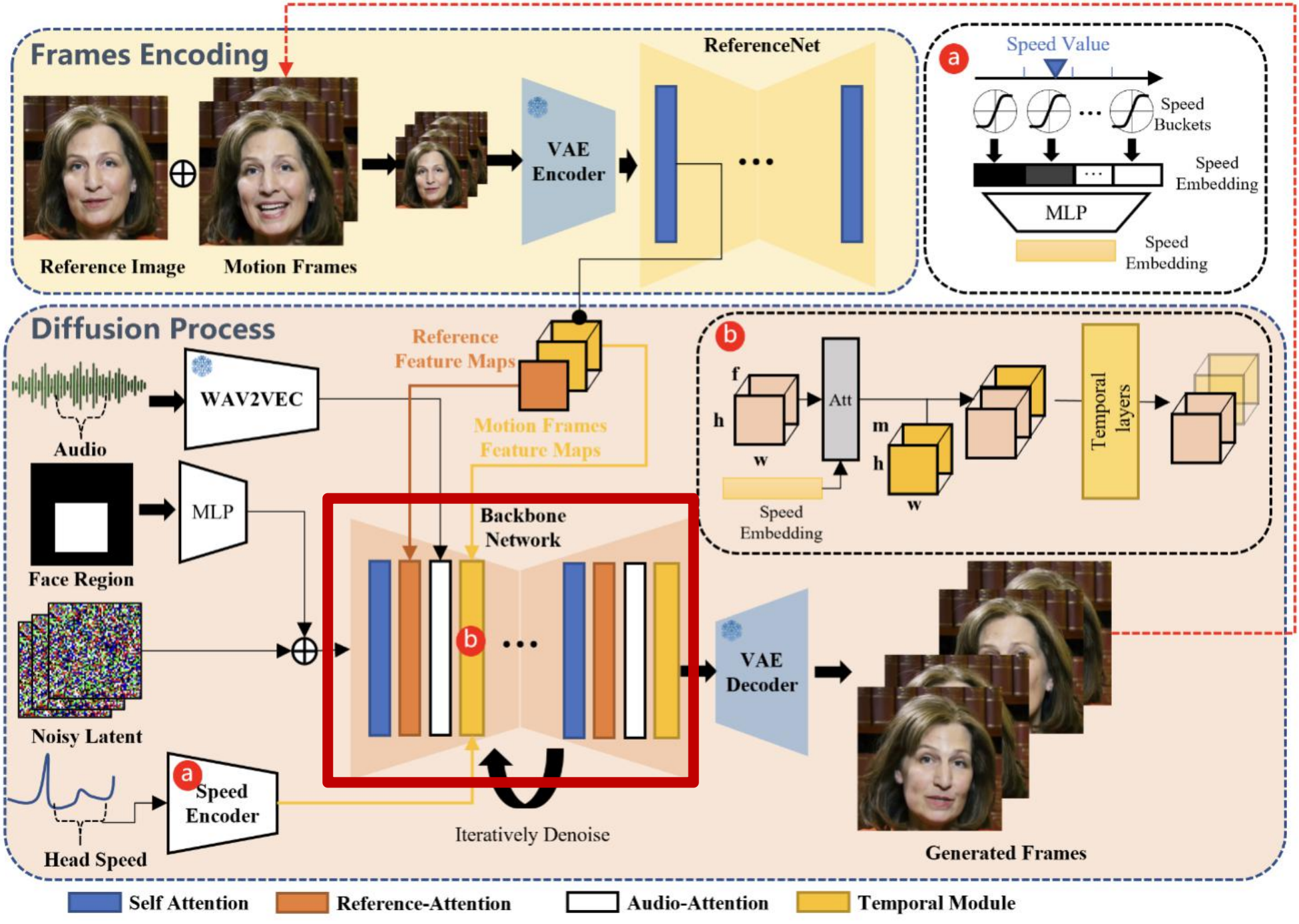


03 工作原理

Backbone

1、特征对齐与生成 – 多种Attention机制
(红+橙+白)

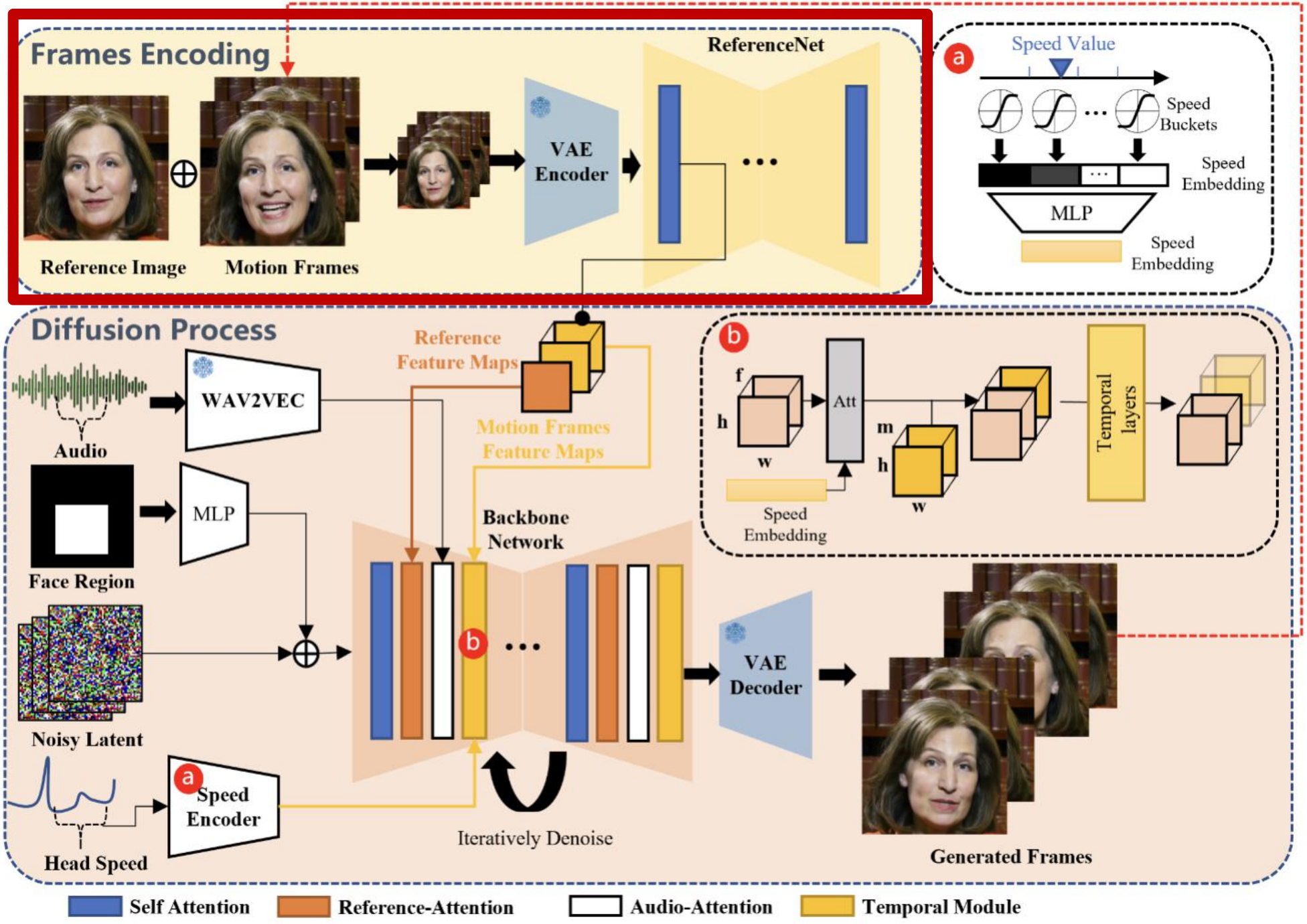
- Self–Attention (Stable Diffusion 1.5)
- Reference–Attention
- Audio–Attention
- Temporal Module



Backbone

2、细看 Reference

- ReferenceNet
- motion frames

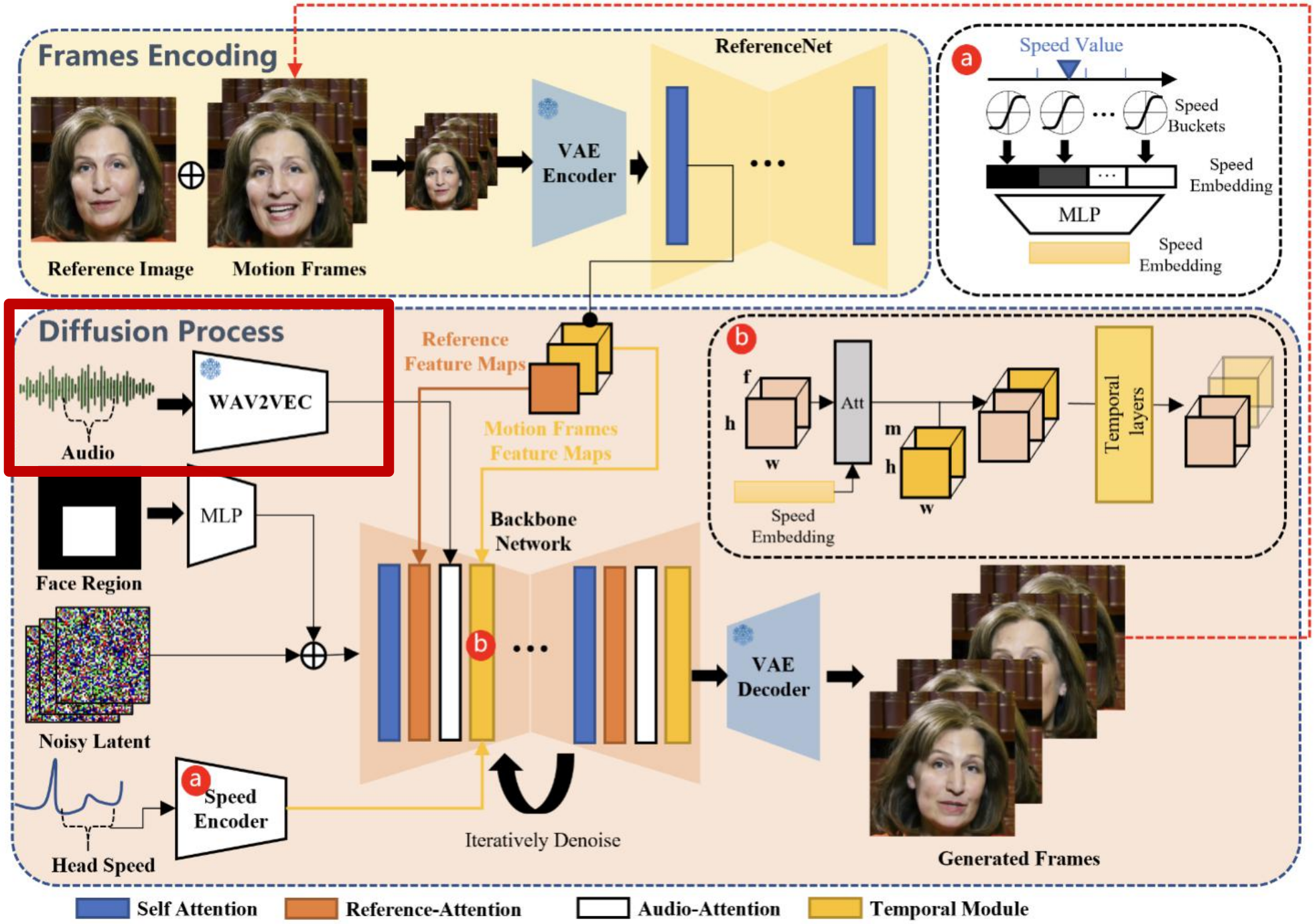


Backbone

3、Audio (白)

・V2V

(Voice to Vector)



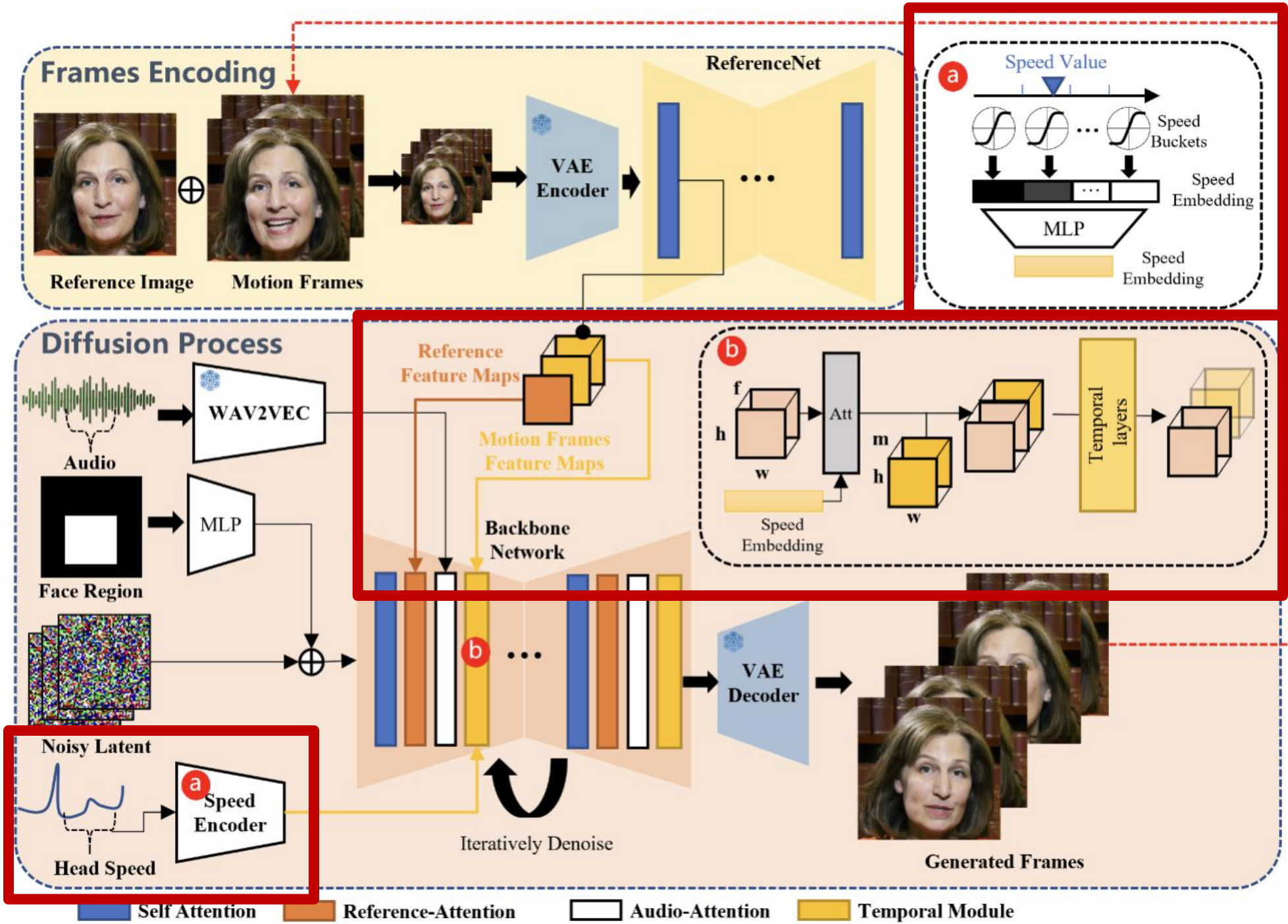
Backbone

4、连贯视频生成(黄)

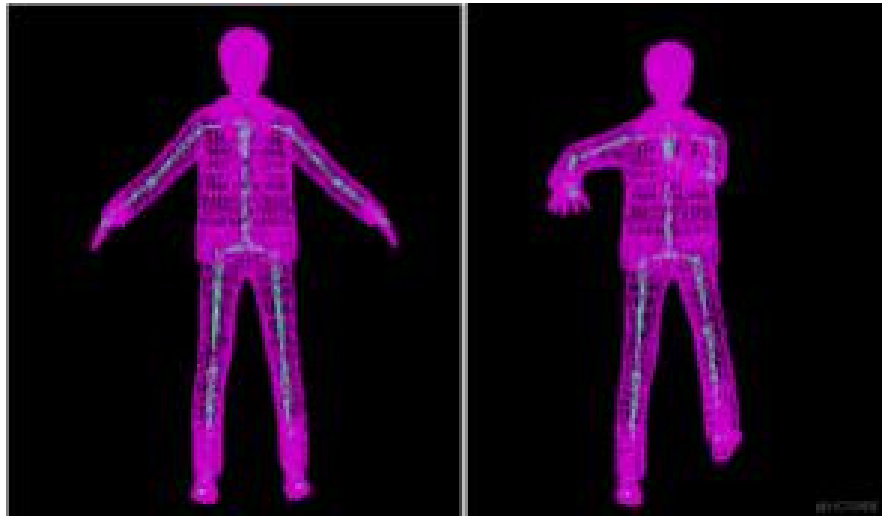
· Temporal Module

· Animate Diffusion

· Speed Encoder (bucketing (分桶), embedding)



深度学习中弱控制的优势与弊端：

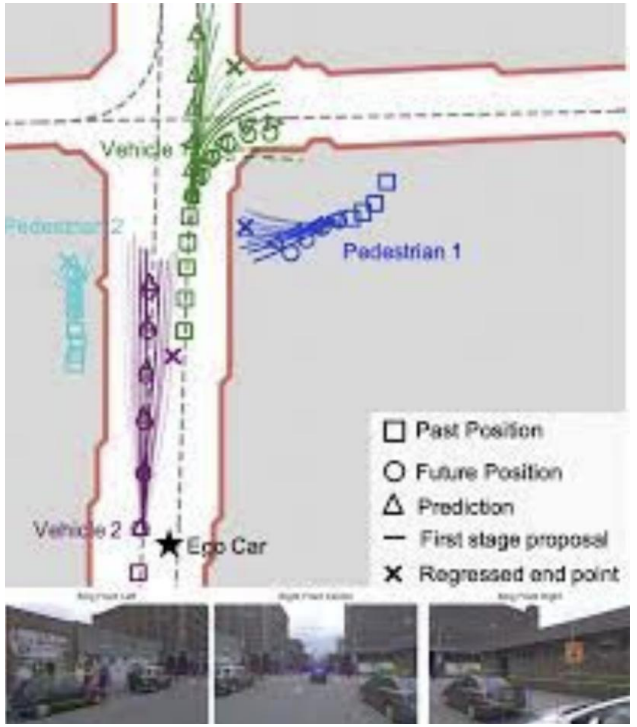


优势：灵活性高、训练速度快

弊端：精度有限

稠密控制：

骨架标注、面部标注、语义分割、轨迹标注



04 训练过程

Stage 1. Image pretraining: Backbone Network takes a single frame as input. ReferenceNet handles a distinct randomly chosen frame from the same video clip, Face Locator

Stage 2. Video training: temporal modules and audio layers, n+f contiguous frames are sampled from the video clip

Stage 3. speed layers and temporal modules (simultaneous training of lloth the speed and audio layers undermines the driven ability of the audio on the character's motions.)

We collected approximately 250 hours of talking head videos from the internet and supplemented this with the HDTF and VFHQ datasets to train our models.

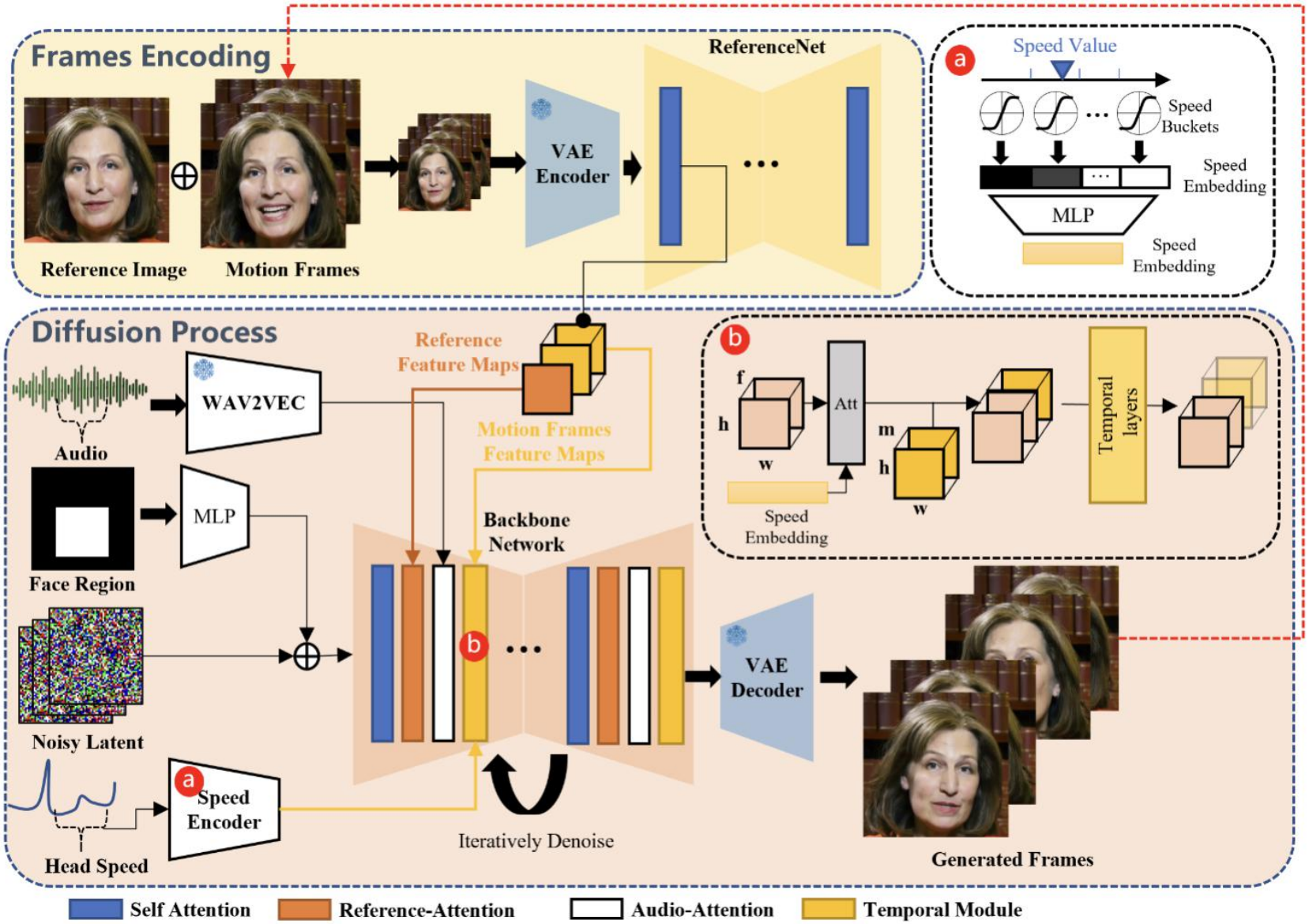
Head rotation velocity was labeled by extracting the 6-DoF head pose for each frame using facial landmarks, followed by calculating the rotational degrees between successive frames.

训练过程

1. 纯图像生成训练

2. 视频生成训练

3. 头部速度控制训练



谢谢大家！

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