Overview of Zero-Shot Multi-speaker TTS Systems

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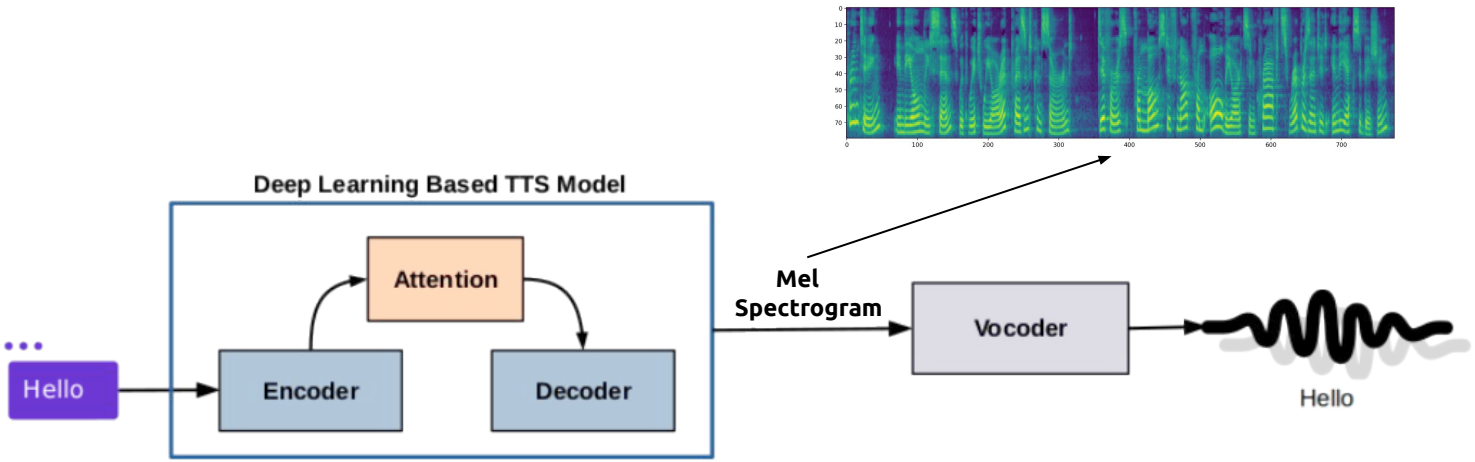
Agenda

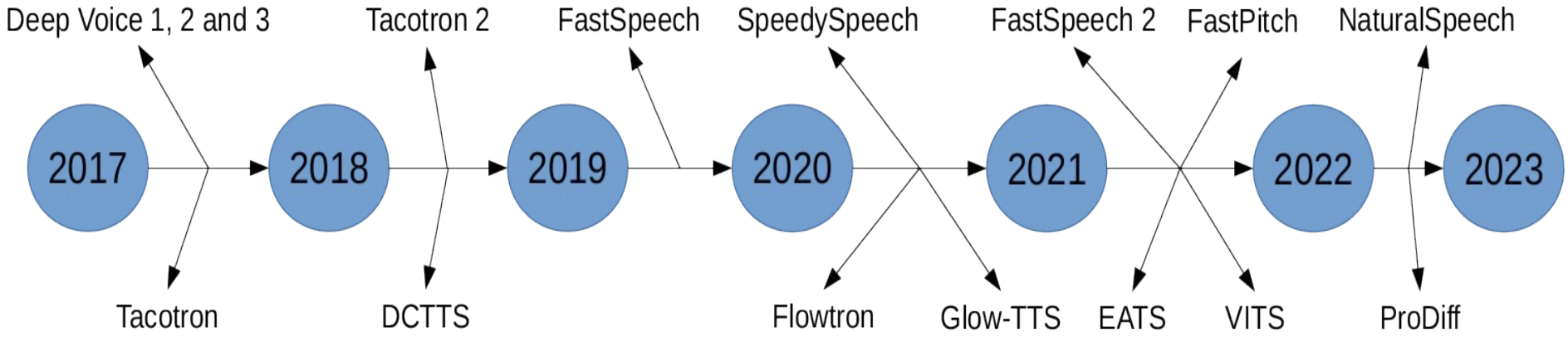
- Text to Speech (TTS)
- What is zero-shot multi-speaker TTS (ZS-TTS)?
- Multi-speaker TTS versus ZS-TTS
- How important is the Speaker Encoder for ZS-TTS?
- ZS-TTS main papers
- Main ZS-TTS open-source implementations
- ZS-TTS state-of-the-art audio samples

Text to Speech

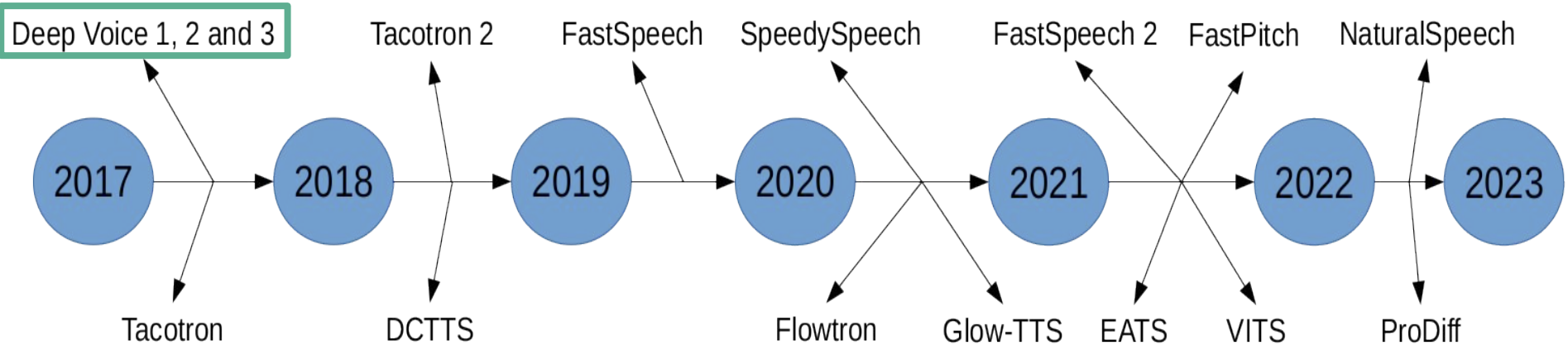
- From 2010s, neural network-based speech synthesis has gradually become the dominant method and achieved much better voice quality (Tan et al. 2021).



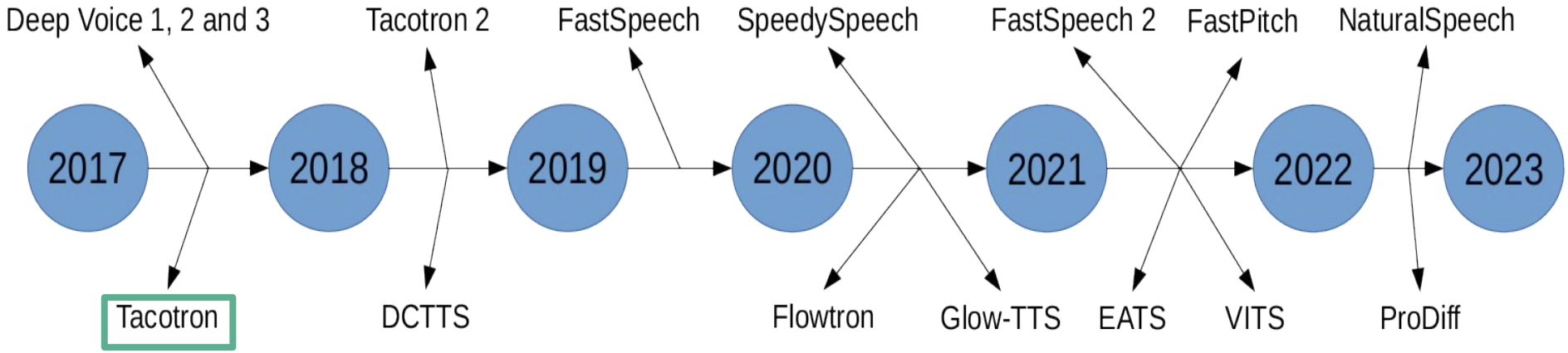
Text to Speech



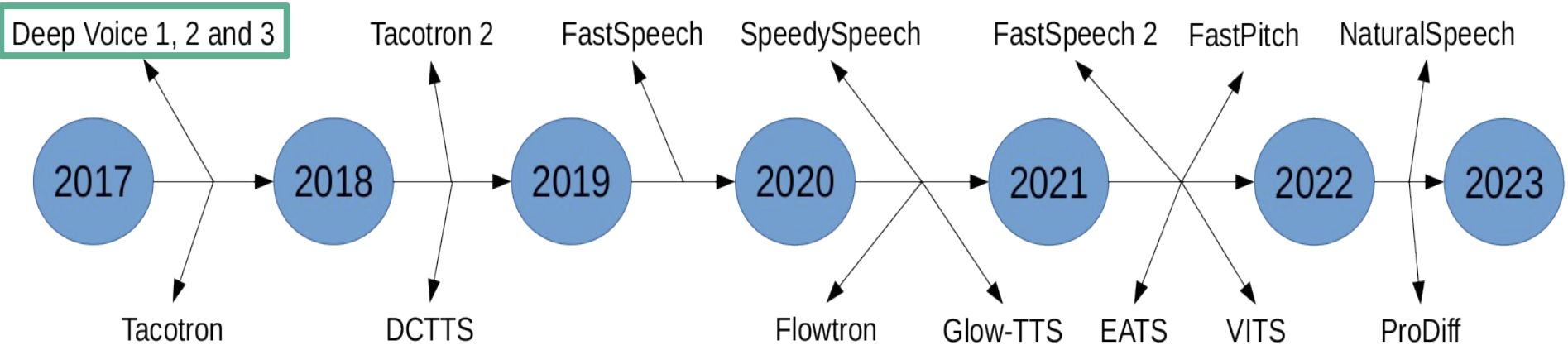
Text to Speech



Text to Speech



Text to Speech



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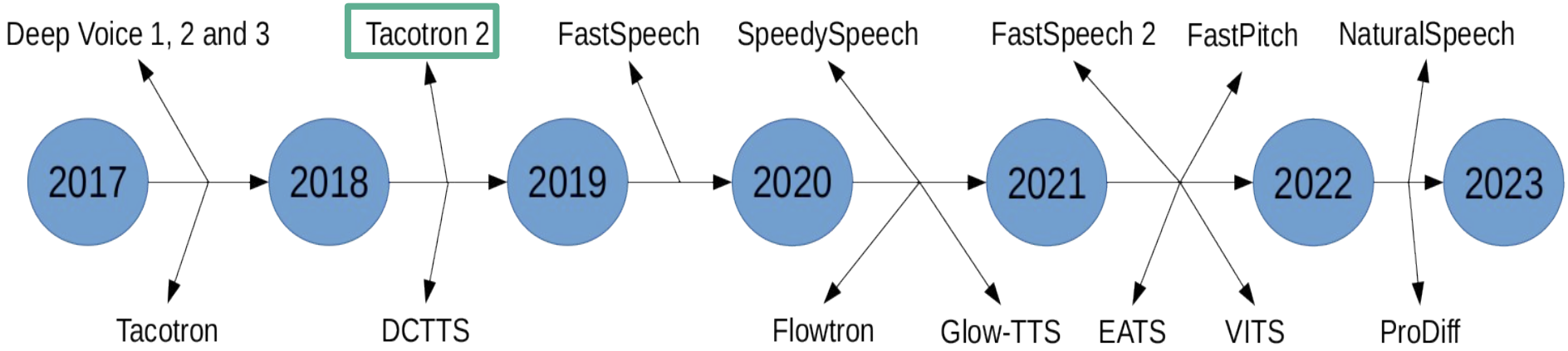

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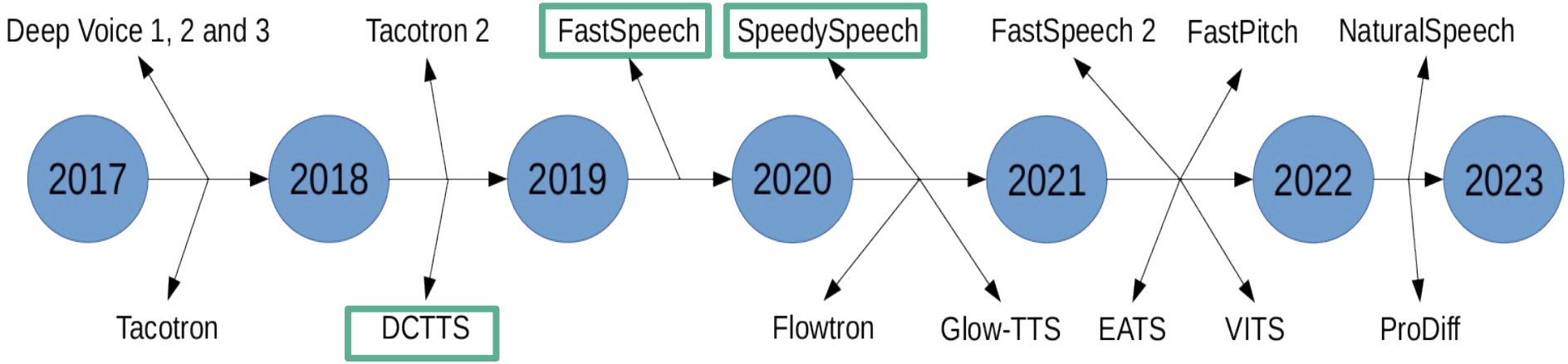

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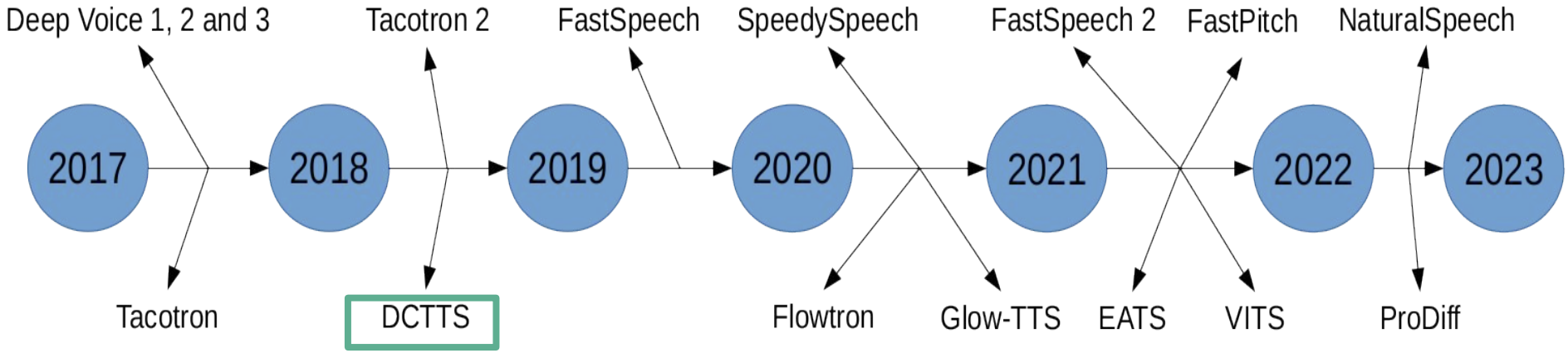

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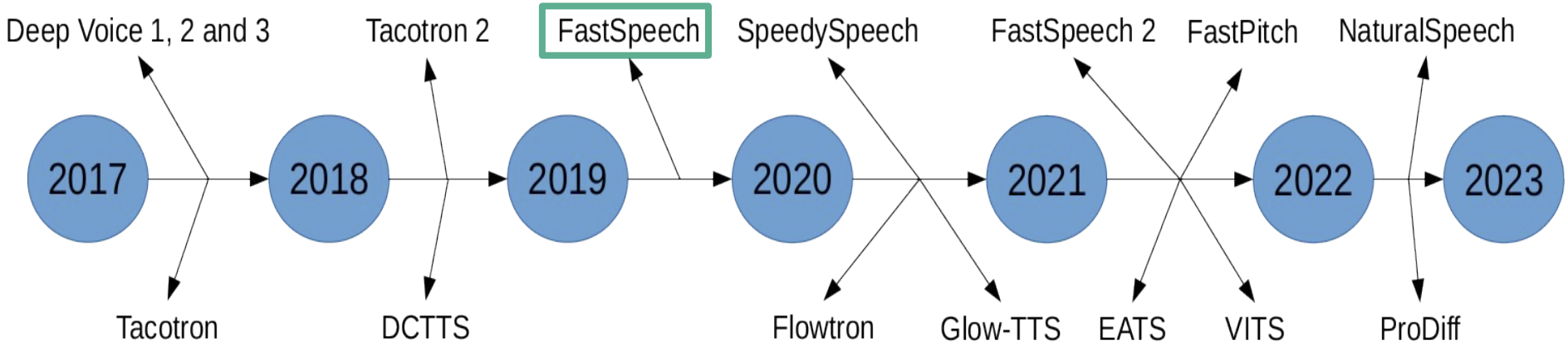

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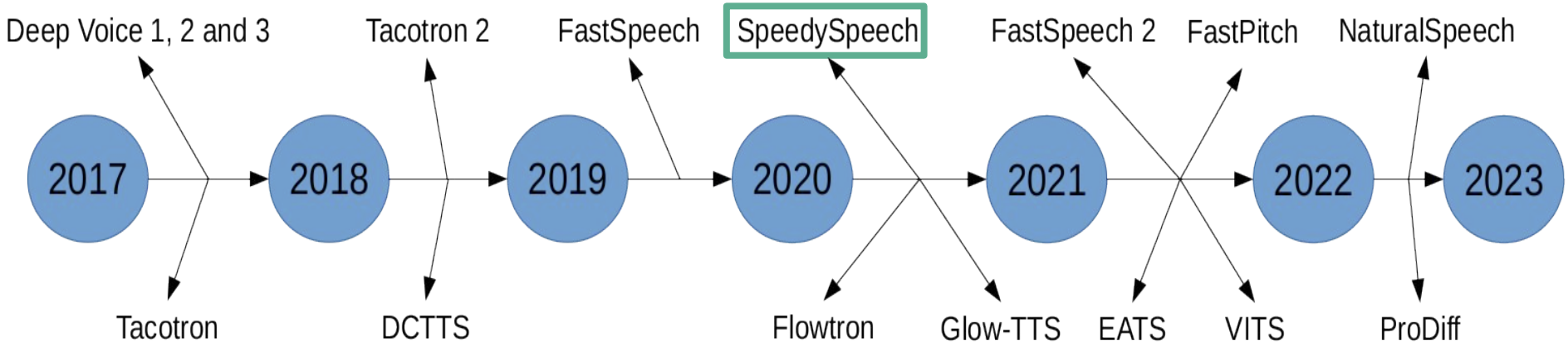

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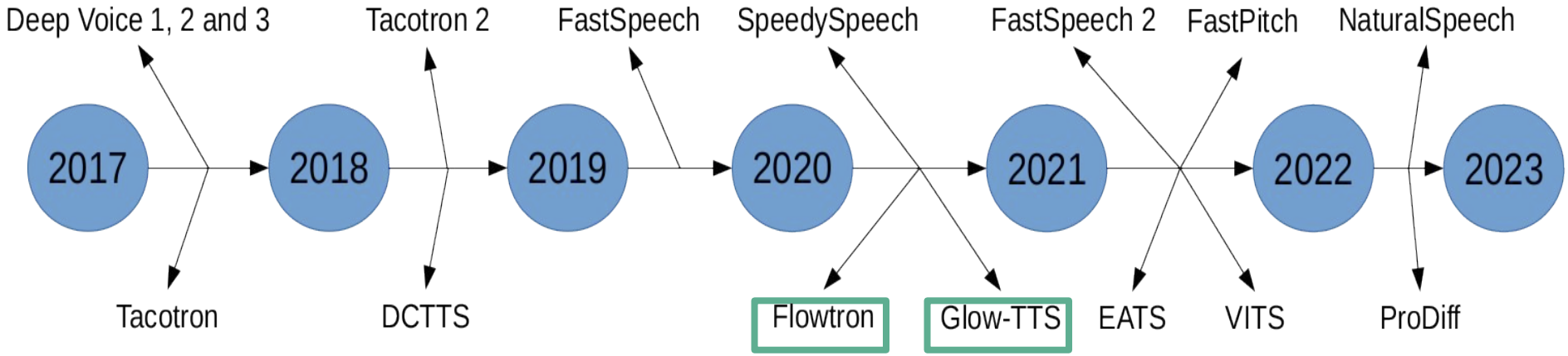

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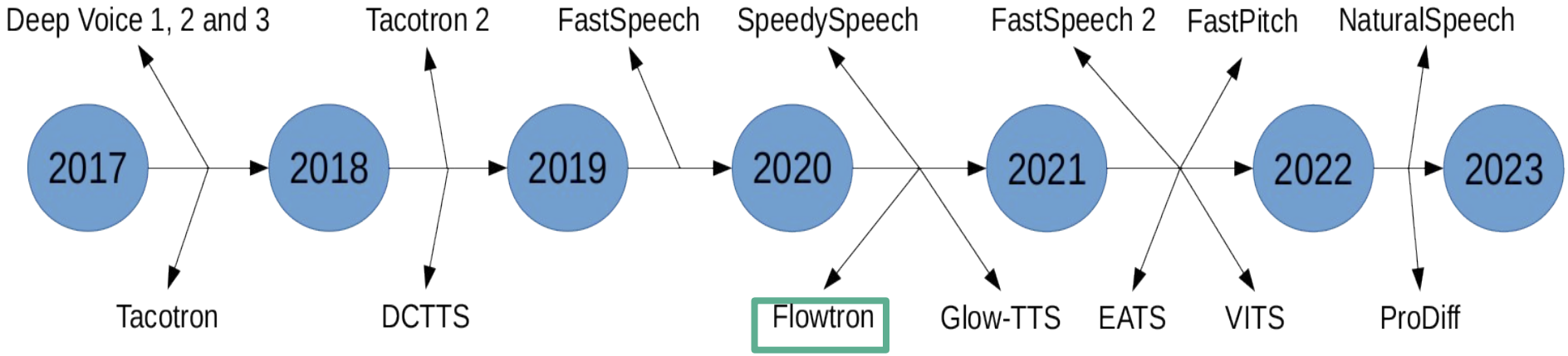

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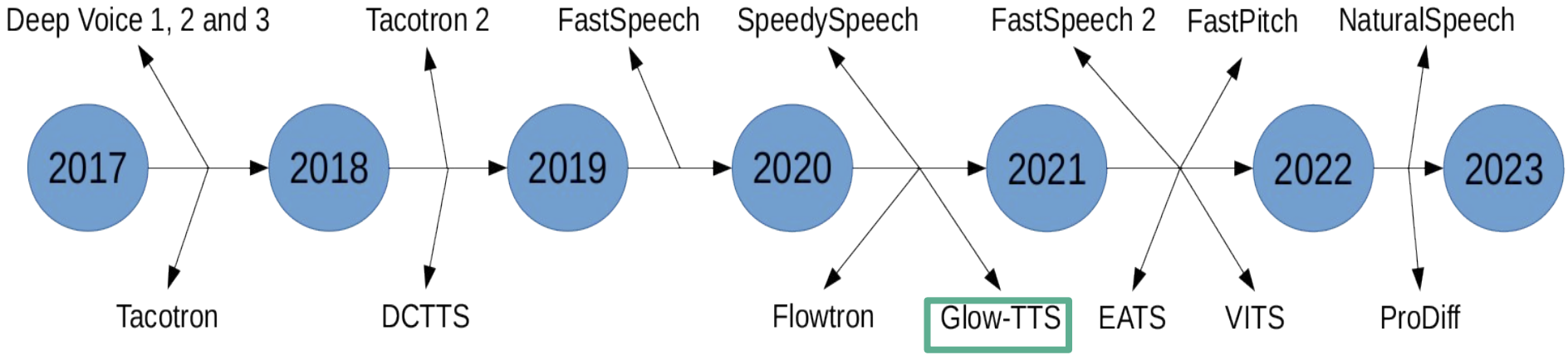

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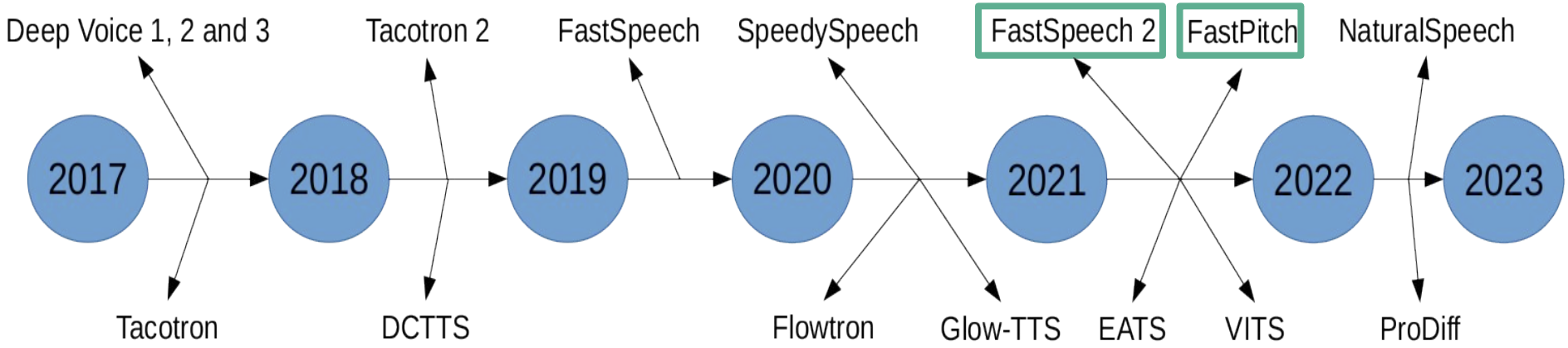

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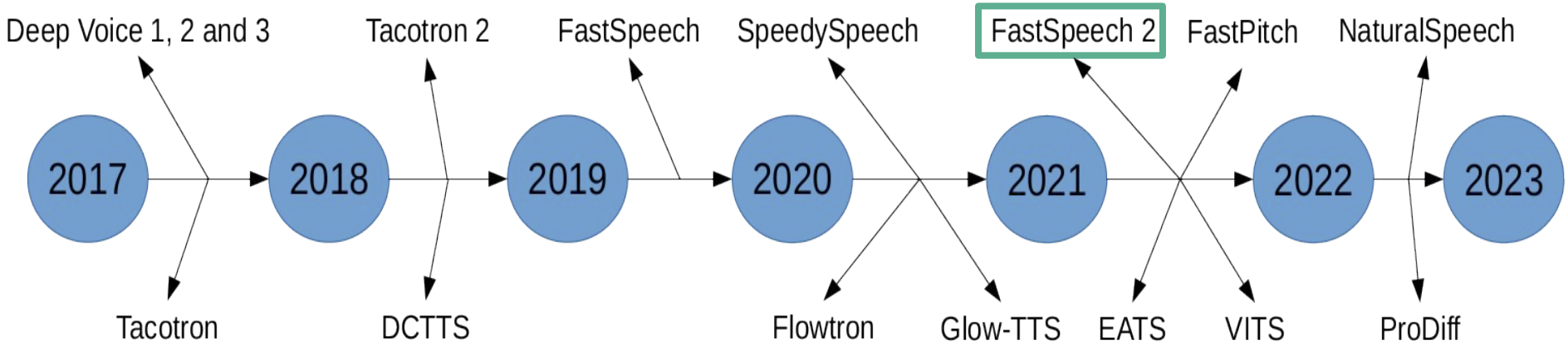

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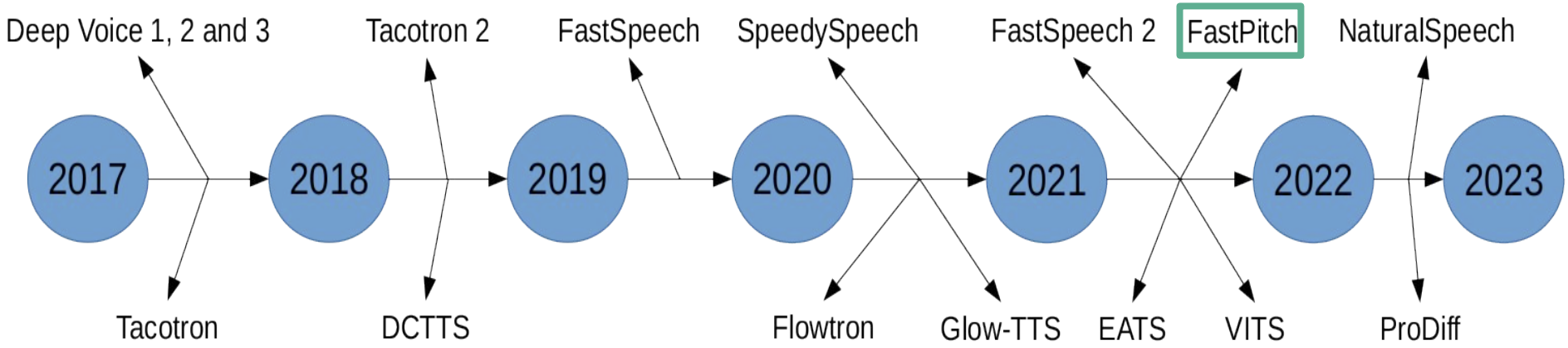

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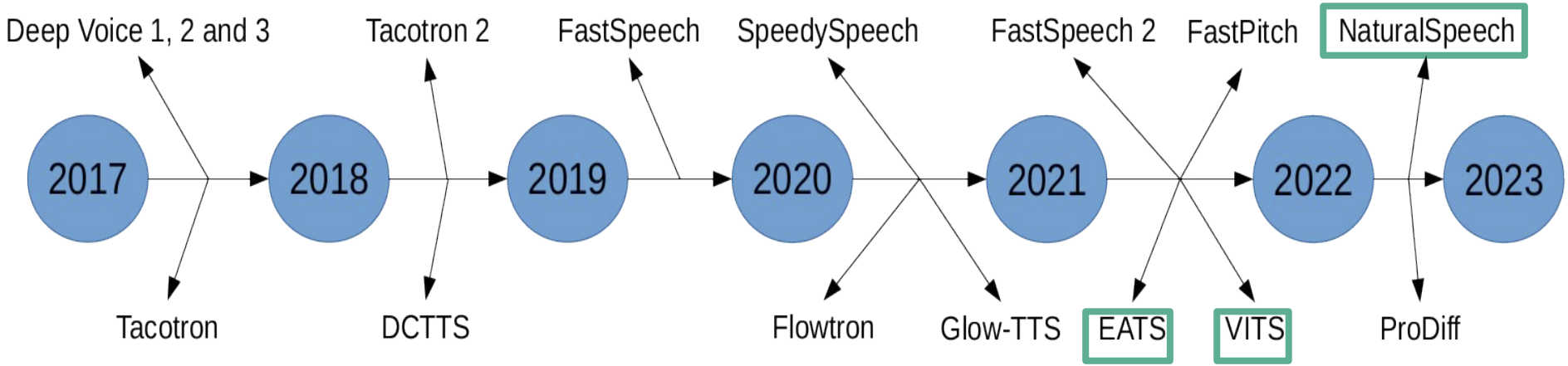

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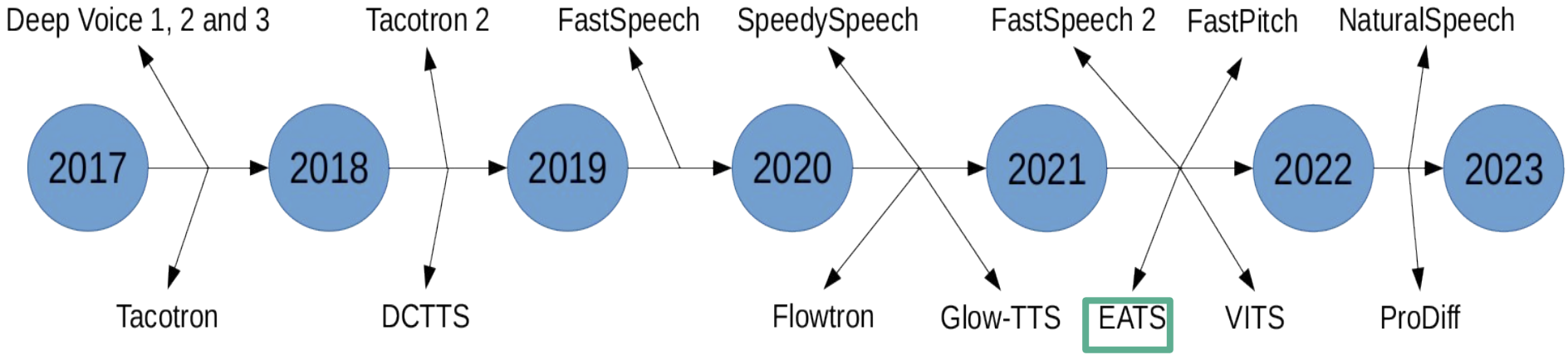

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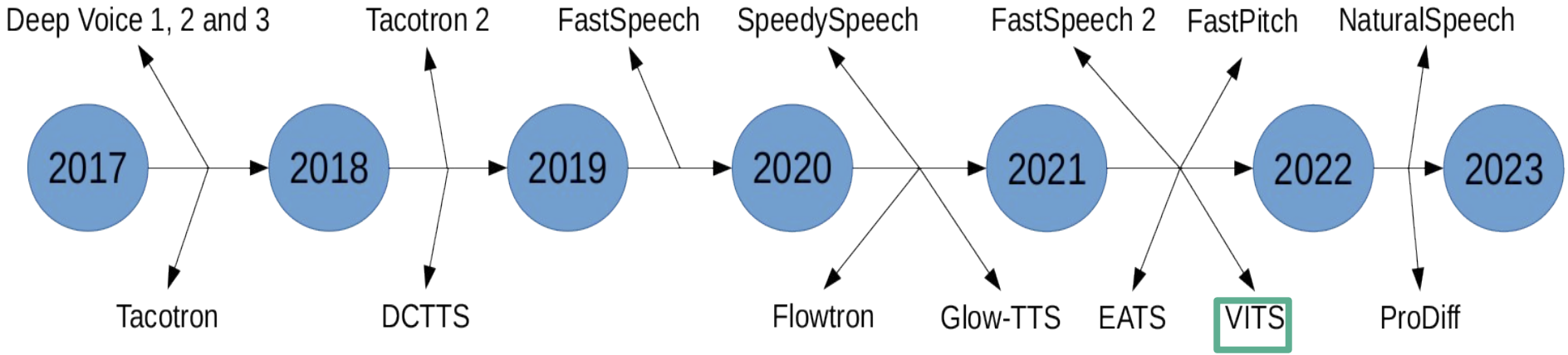

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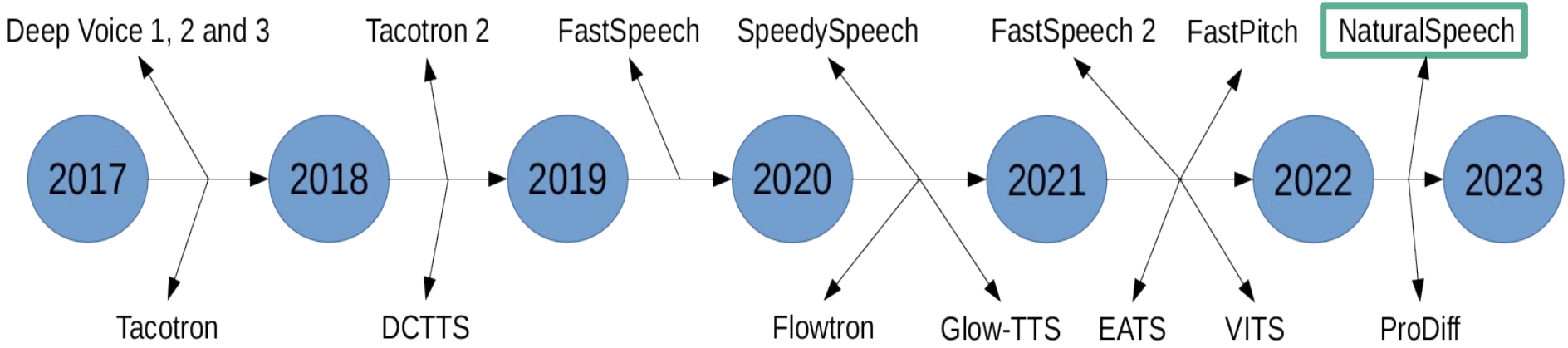

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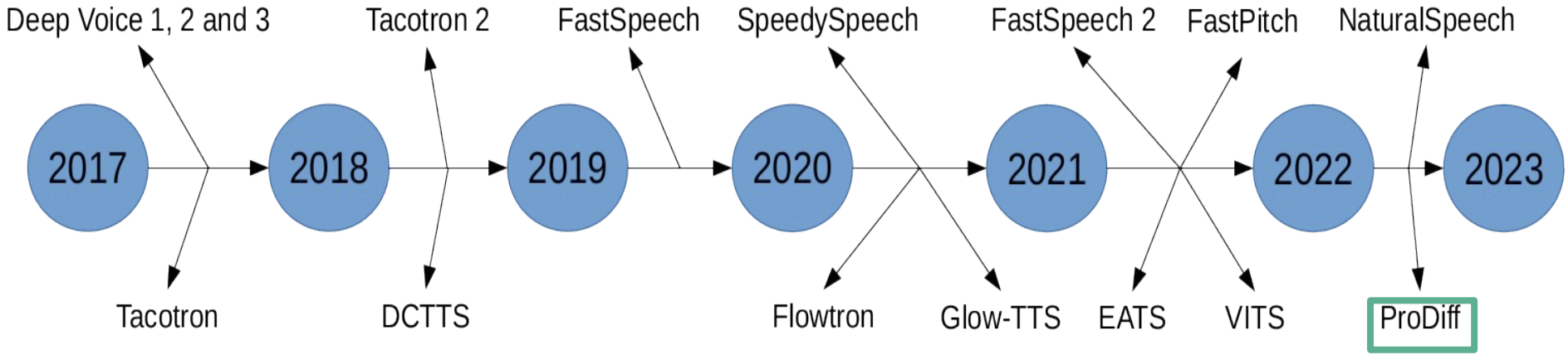
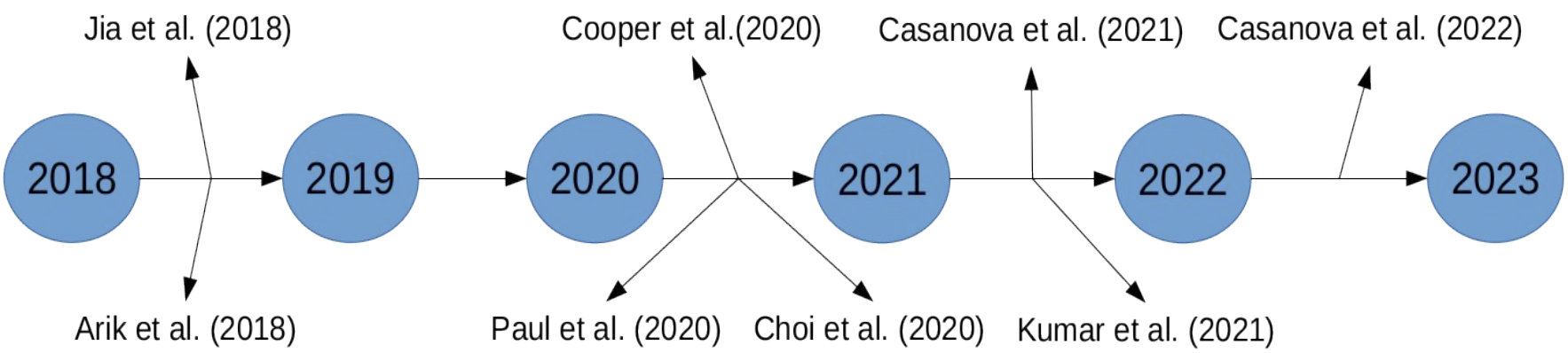


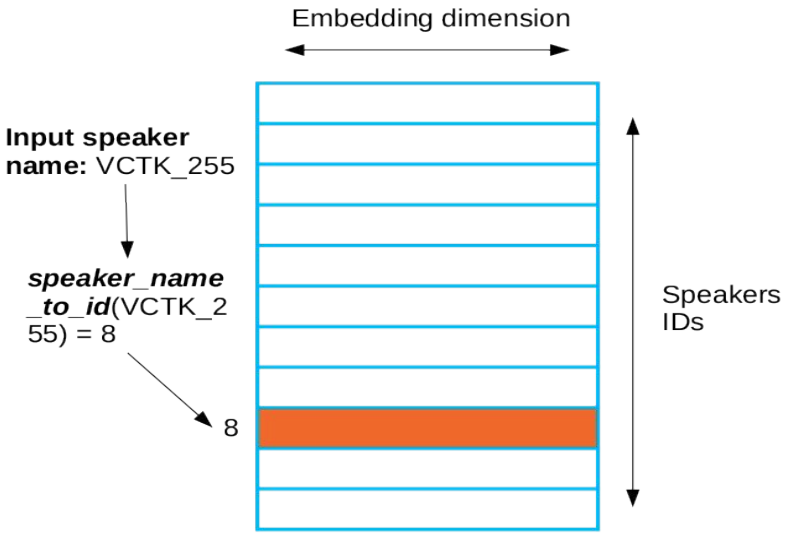
What is zero-shot multi-speaker TTS?

- In 2018, advances in speech synthesis motivated research that aimed to synthesize speech in the voice of a target speaker using just a few seconds of speech.



MULTI-SPEAKER TTS MODELS

- Uses a lookup table with learned fixed-size vectors to represent each speaker (speaker embedding).
- These fixed-size vectors are normally conditioned on the TTS model decoder.

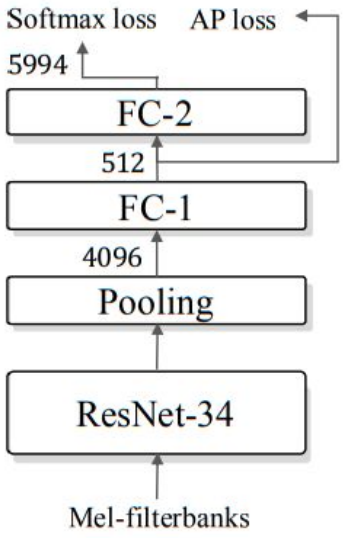


Zero-shot multi-speaker TTS

- Uses speaker embeddings extracted from an external speaker encoder/speaker verification system.
- Therefore, the speaker encoder is a very important module for the final quality of a zero-shot multi-speaker TTS model.

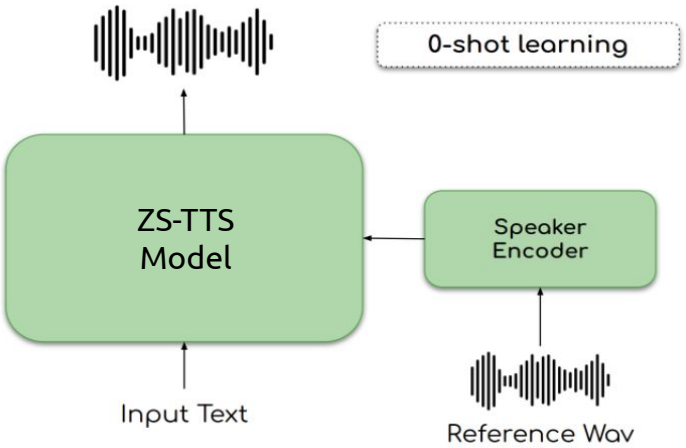
Speaker Encoder

- Losses:
  - Softmax
  - Angular Softmax
  - Angular Prototypical
  - Angular Margin Softmax
  - Generalized end2end loss
- Voxceleb Dataset:
  - 7k speakers
  - 145 different nationalities
- Produces good embeddings for new speakers

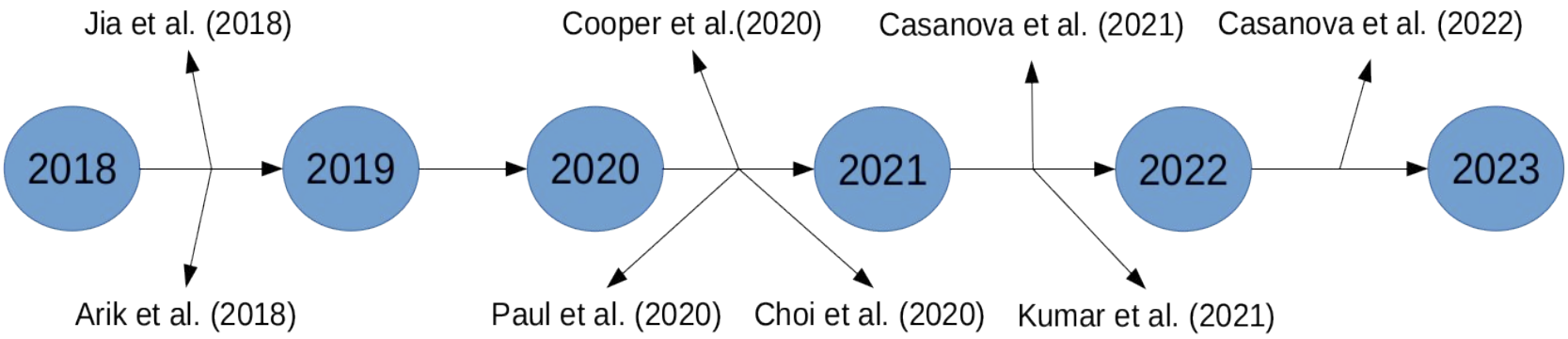


Zero-shot multi-speaker TTS

- On inference time it is able to clone a target speaker's voice not seen in training using just a few seconds of speech.
- Trained with thousand of speakers:
  - VCTK: 109 speakers
  - LibriTTS: 1151 speakers (train clean partitions)



Zero-shot multi-speaker TTS



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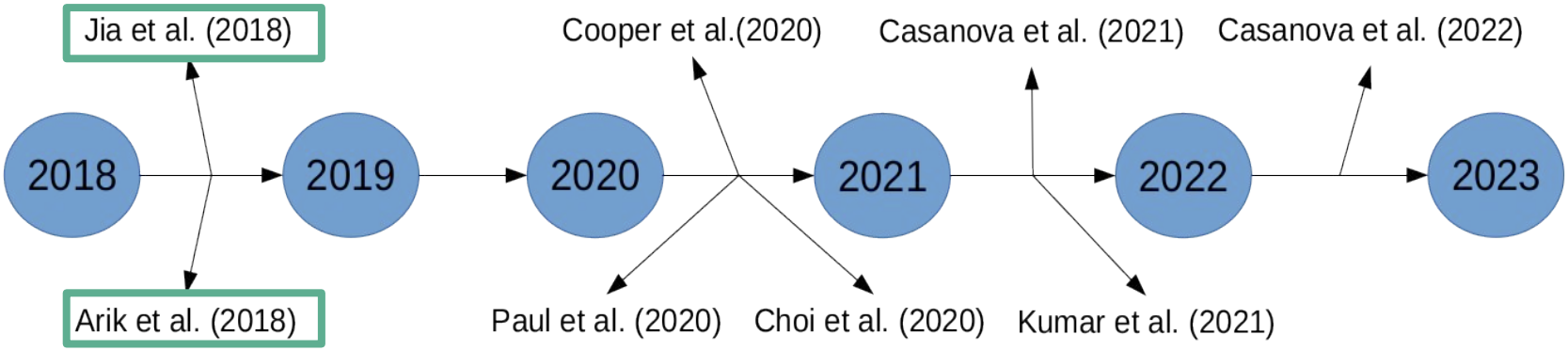
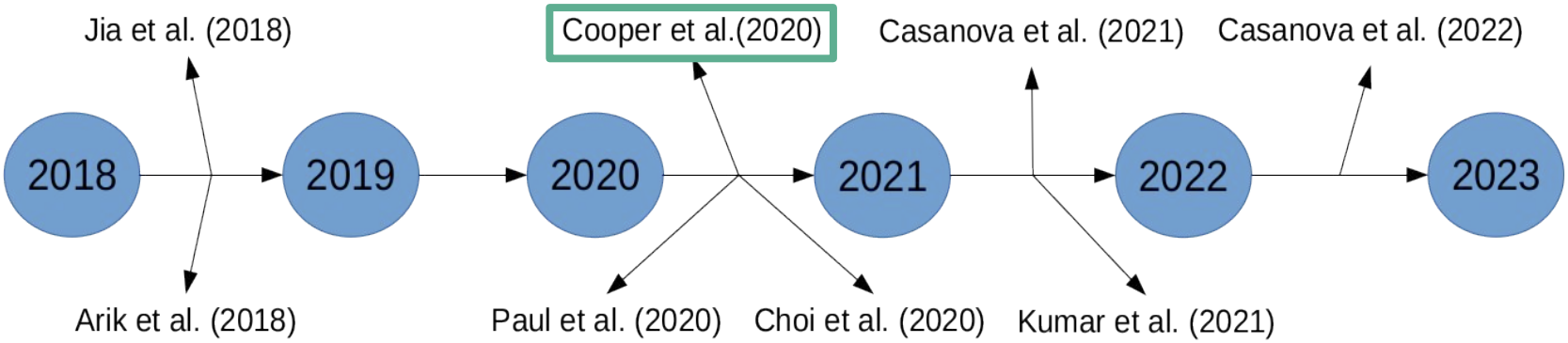
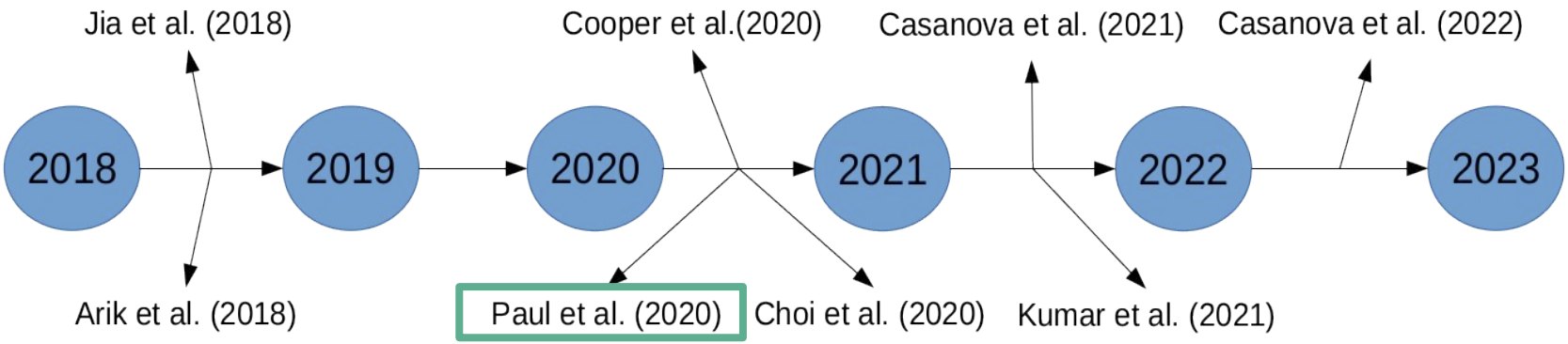


Zero-shot multi-speaker TTS



Zero-shot multi-speaker TTS



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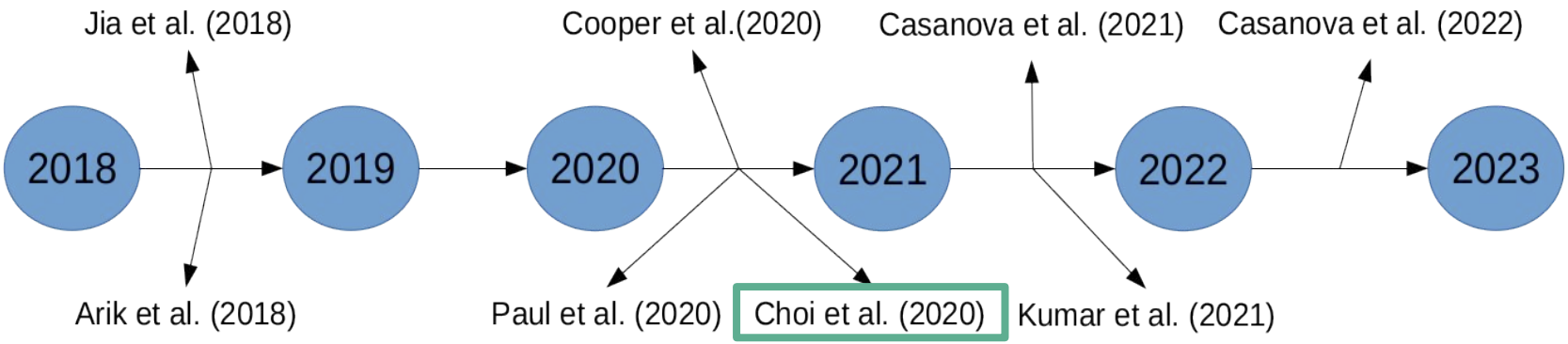
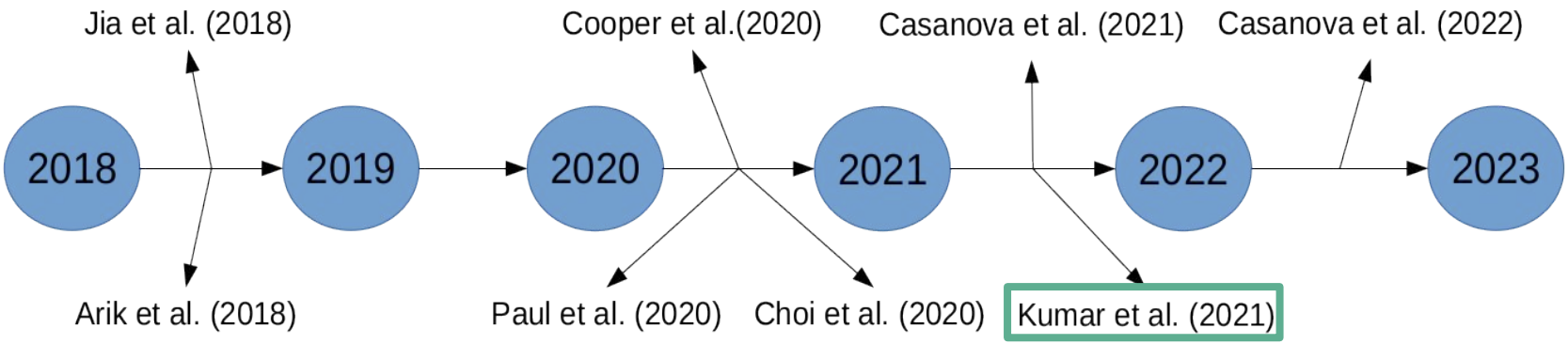
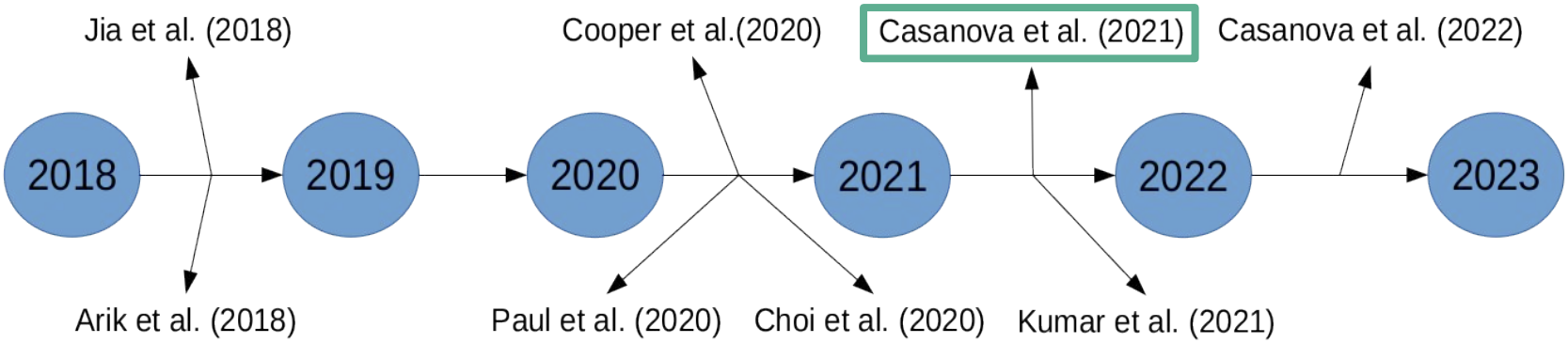


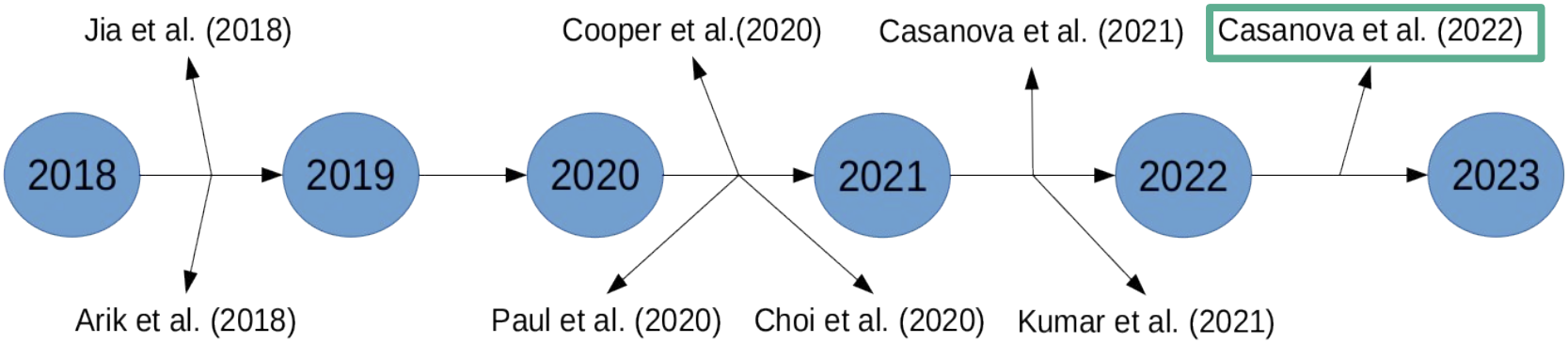
Zero-shot multi-speaker TTS



Zero-shot multi-speaker TTS



Zero-shot multi-speaker TTS



Open-source: Zero-shot multi-speaker TTS

- Cooper et al. 2020:
  - https://github.com/nii-yamagishilab/multi-speaker-tacotron
- Paul et al. 2020:
  - https://github.com/dipjyoti92/SC-WaveRNN
- Jia et al. 2018, SC-GlowTTS and YourTTS:
  - TTS: https://github.com/coqui-ai/TTS

multi-speaker-tacotron

VCTK multi-speaker tacotron for ICASSP 2020

Python 253 43

SC-WaveRNN

Official PyTorch implementation of Speaker Conditional WaveRNN

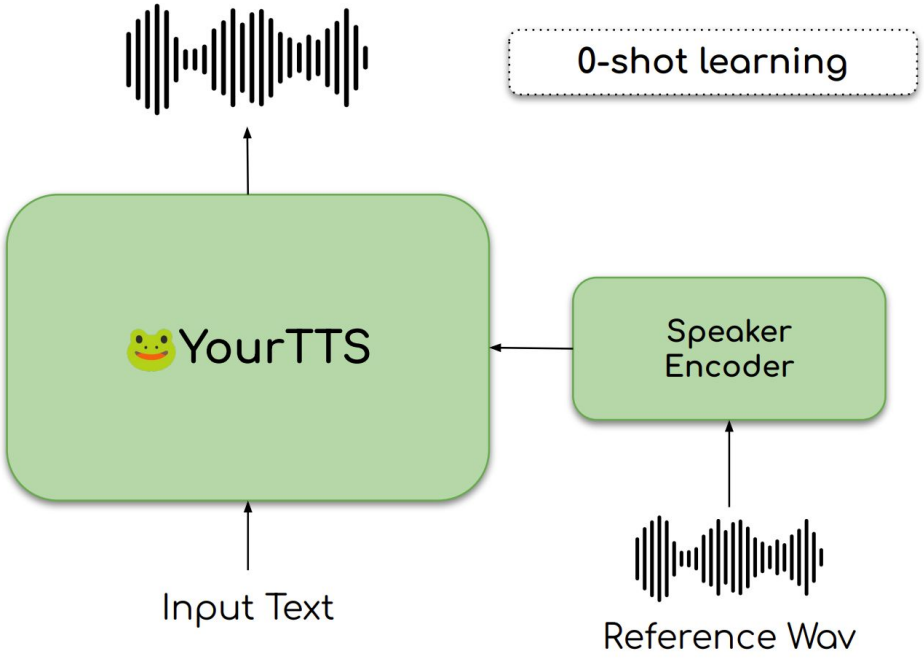
Python 104 18

TTS Public

- a deep learning toolkit for Text-to-Speech, battle-tested in research and production

Python 6.6k 692

YourTTS: Zero-shot and Multilingual TTS

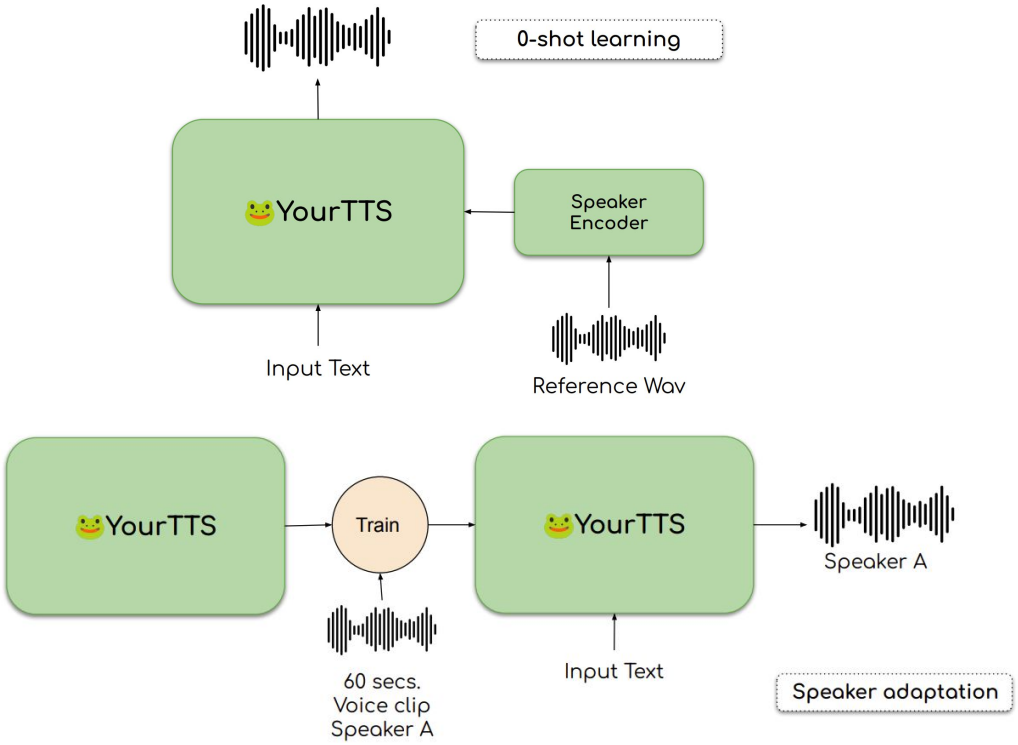


Julian reference

Julian zero-shot FR

Julian zero-shot EN

YourTTS: Zero-Shot and Speaker Adaptation - English

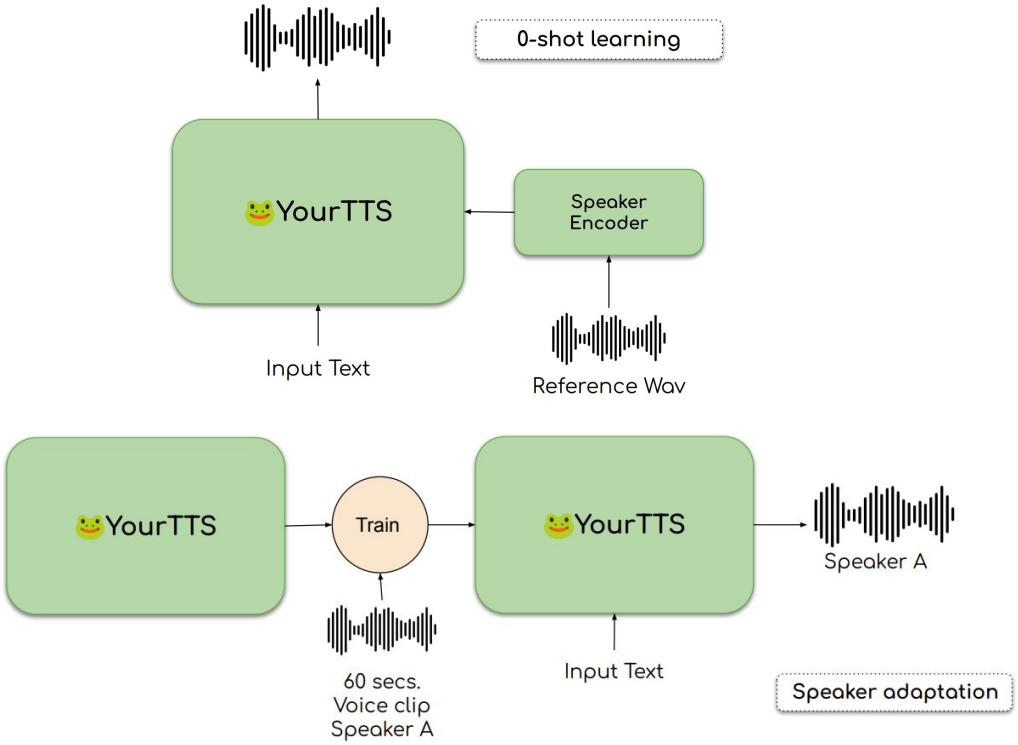


Chris reference

Chris Zero-Shot

Chris Fine-Tuned

YourTTS: Zero-Shot and Speaker Adaptation - Portuguese



Moacir reference

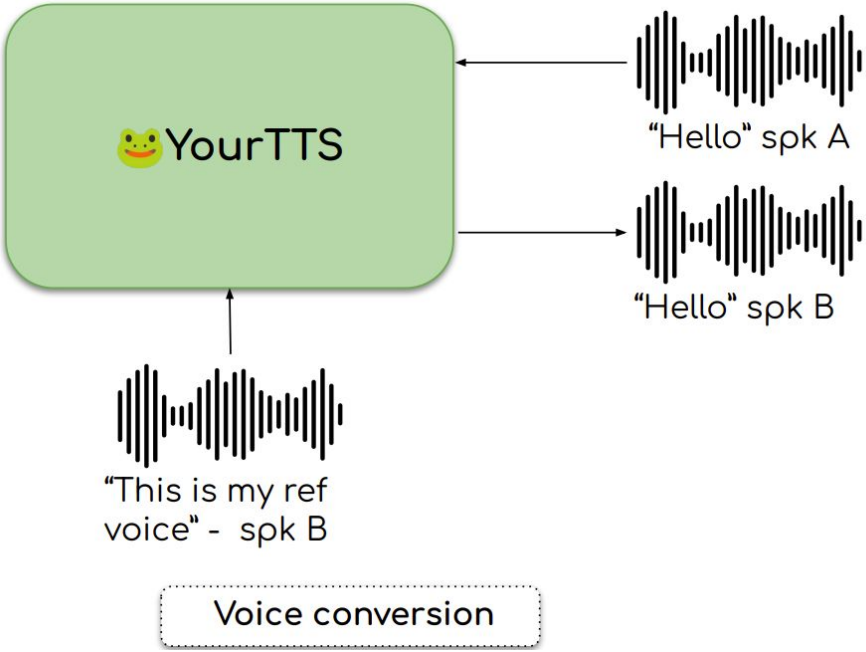
Moacir Zero-Shot

Moacir Fine-Tuned PT

Moacir Fine-Tuned EN

Moacir Fine-Tuned FR

YourTTS: Zero-shot Voice Conversion



p228 target speaker reference

p226 driving audio

p226 converted into p228

YourTTS: try it yourself

- TTS inference instructions:
  - https://github.com/Edresson/YourTTS#coqui-tts-released-model

- Demo of our latest YourTTS English only model:
  - https://coqui.ai/

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few

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