Harnessing the power of AI in Text to Speech

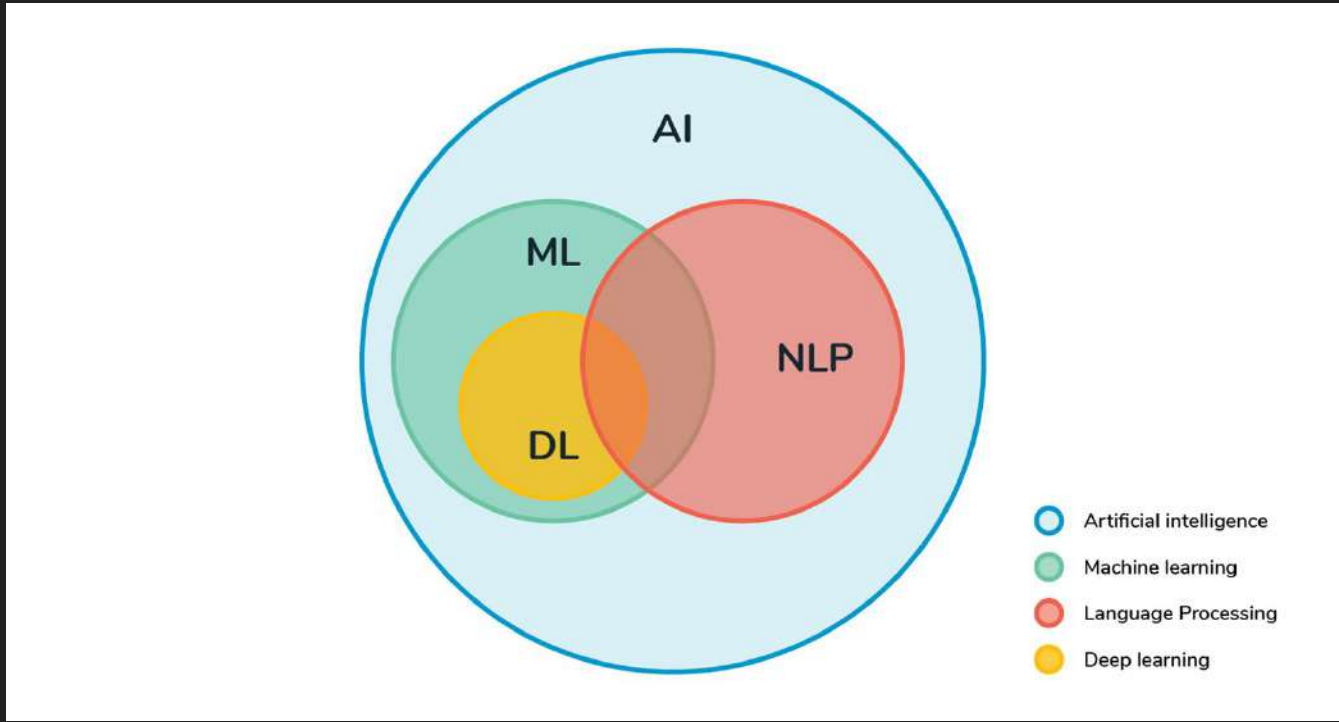
Using TTS in 2021 and Beyond

Overview

- What is Text To Speech [TTS]?
- Why is spoken language difficult?
- What to consider with TTS
- Let’s make some TTS
- Providers

A word about AI

Artificial Intelligence is a large area of study, and primarily has seen Language Processing as a Data and Statistical problem. NLP is the branch that overlaps with what we see today in Machine Translation and Speech.



A historical progression

Every time I fire a linguist, the performance of our speech recognition system goes up.
-Fred Jelink 1985

1950

Starting out

Originally from the 30's Speech synthesis. It works but not always

1980

Statistics

Calculating statistical probabilities leads to better results.

2010

The age of the Neural Network

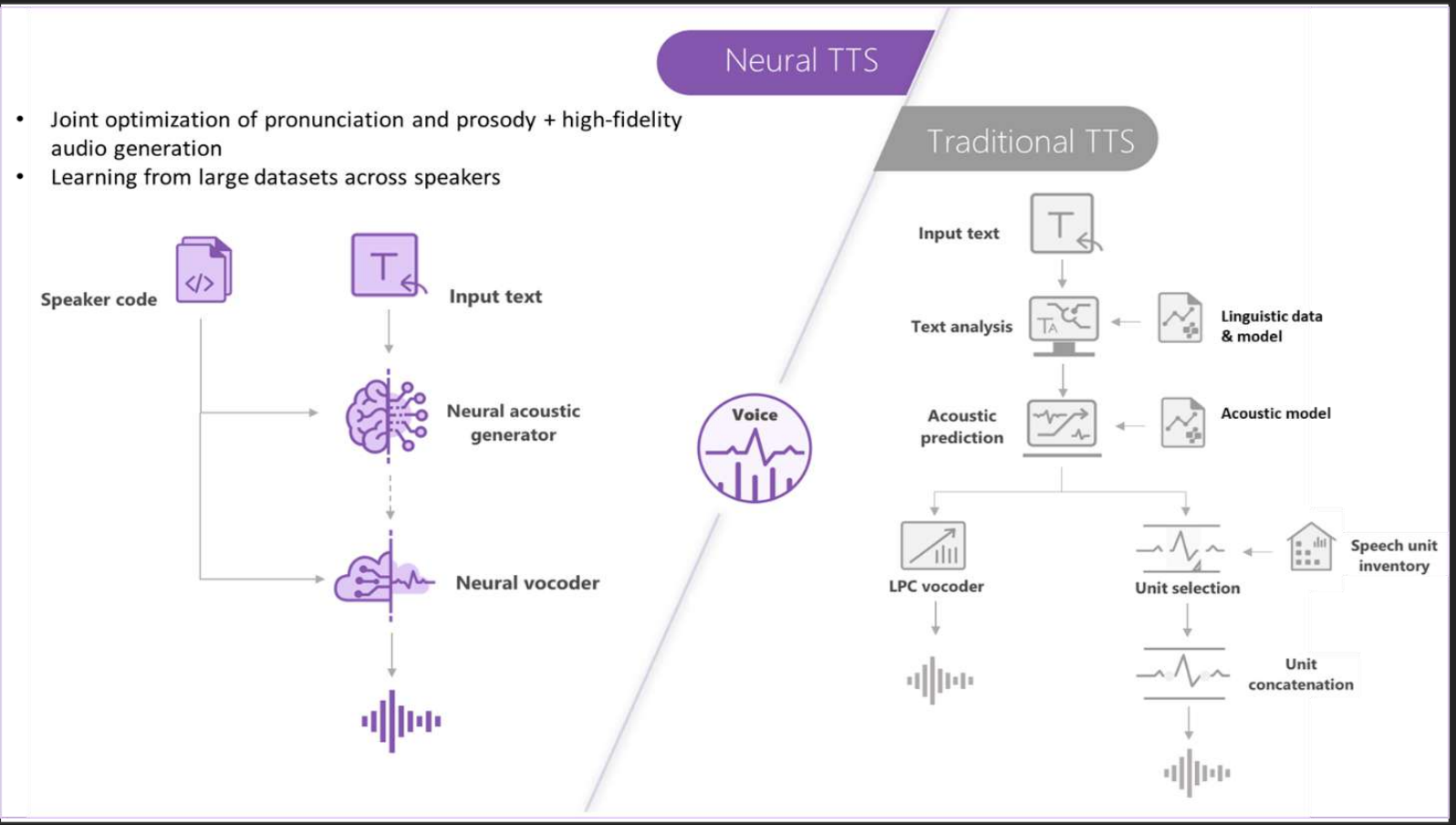
Neural Networks, TacoTron, WaveNet, Machine Learning and more Neural Networks

2020

Today

1-shot from hearing to speaking
Robust cloud models
Voice Agents everywhere

Microsoft 2019



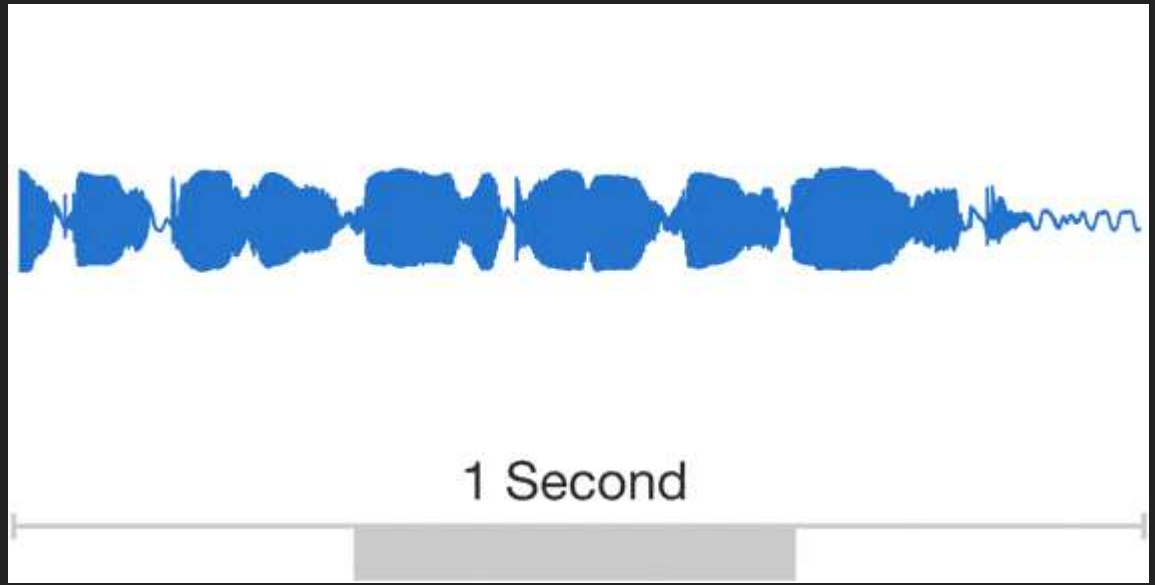
https://azure.microsoft.com/en-us/blog/microsoft-s-new-neural-text-to-speech-service-helps-machines-speak-like-people/

2008-2016: many changes in the AI space

We moved fr
procedural
statistical
processing t
massively
parallel
processing.

Text To Speech is difficult

Speech is made up of sounds, and those sounds are complicated:



https://www.deepmind.com/blog/article/wavenet-generative-model-raw-audio

Voice is different...

1. watt ewe right iz knot watt u saye.
2. Even if it’s written correctly you can’t tell Bass from Bass...
3. The tools are theoretical
4. No existing “spell-check” or make-language-sound-right-check--human validation required
5. “Standards” vary by language/grammar/transcription method, and more!
6. Everyone has a slightly different implementation and acceptance criteria
7. Not all customers accept

Voice is faster and cheaper

1) Never gets sick
2) Sounds the same months later--Infinite retakes!
3) Doesn’t get tired
4) Doesn’t care what it is saying
5) Engineering costs + QA costs vs. Raw Talent

Prosody/Suprasegmentals [Phonetics 101]

Speech is more than just sounds put together, it's about *how* they are put together.

Suprasegmental: A set of qualities superimposed on a set of phonetic segments

- Pitch / Tone
- Juncture [*e.g.* punctuation]
- Stress [loud/soft]
- Intonation/Rhythm/Melody/pauses
- Duration

AKA: **Prosody**

"I never said that she stole my money"

Sounds versus Words

Localization has traditionally been text-based.

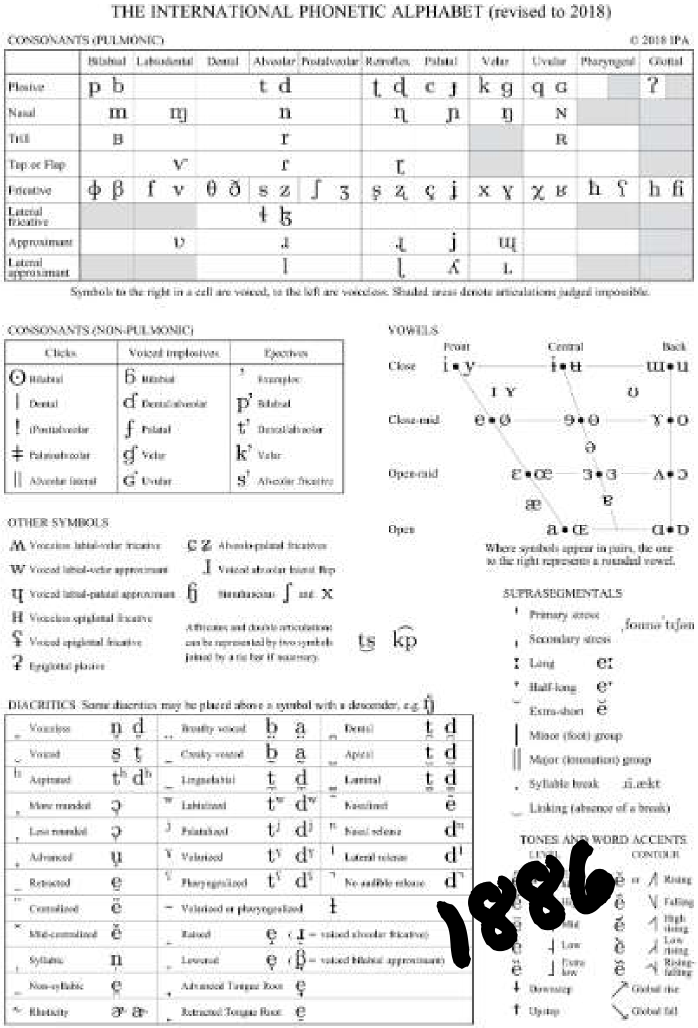
When we do voice--it’s a human actor, reading a written script.

How many CAT tools exist vs. how many “language translation speech tools” exist.

Text has many advantages, until recently we didn’t have similar methods for spoken language and our tools have been limited.

Modern speech tools are a product of the AI/NLP Evolution of the past 5 years

IPA and SSML


THE INTERNATIONAL PHONETIC ALPHABET (revised to 2018)
CONSONANTS (PULMONIC)
© 2018 IPA
CONSONANTS (NON-PULMONIC)
VOWELS
OTHER SYMBOLS
SUPRASEGMENTALS
TONES AND WORD ACCENTS
DIACRITICS
1886


India pale ale
Beer style
India pale ale is a hoppy beer style within the broader category of pale ale. The export style of pale ale, which had become known as India pale ale, developed in England around 1840, later became a popular product there. Wikipedia
Alcohol by volume: 4.5% - 12.1%
Original Gravity: 1.050 - 1.075
Bitterness (IBU): 40 - 120
Color (SRM): 6 - 14
Final Gravity: 1.010 - 1.018
1840

SSML

It’s like HTML, but for speech!

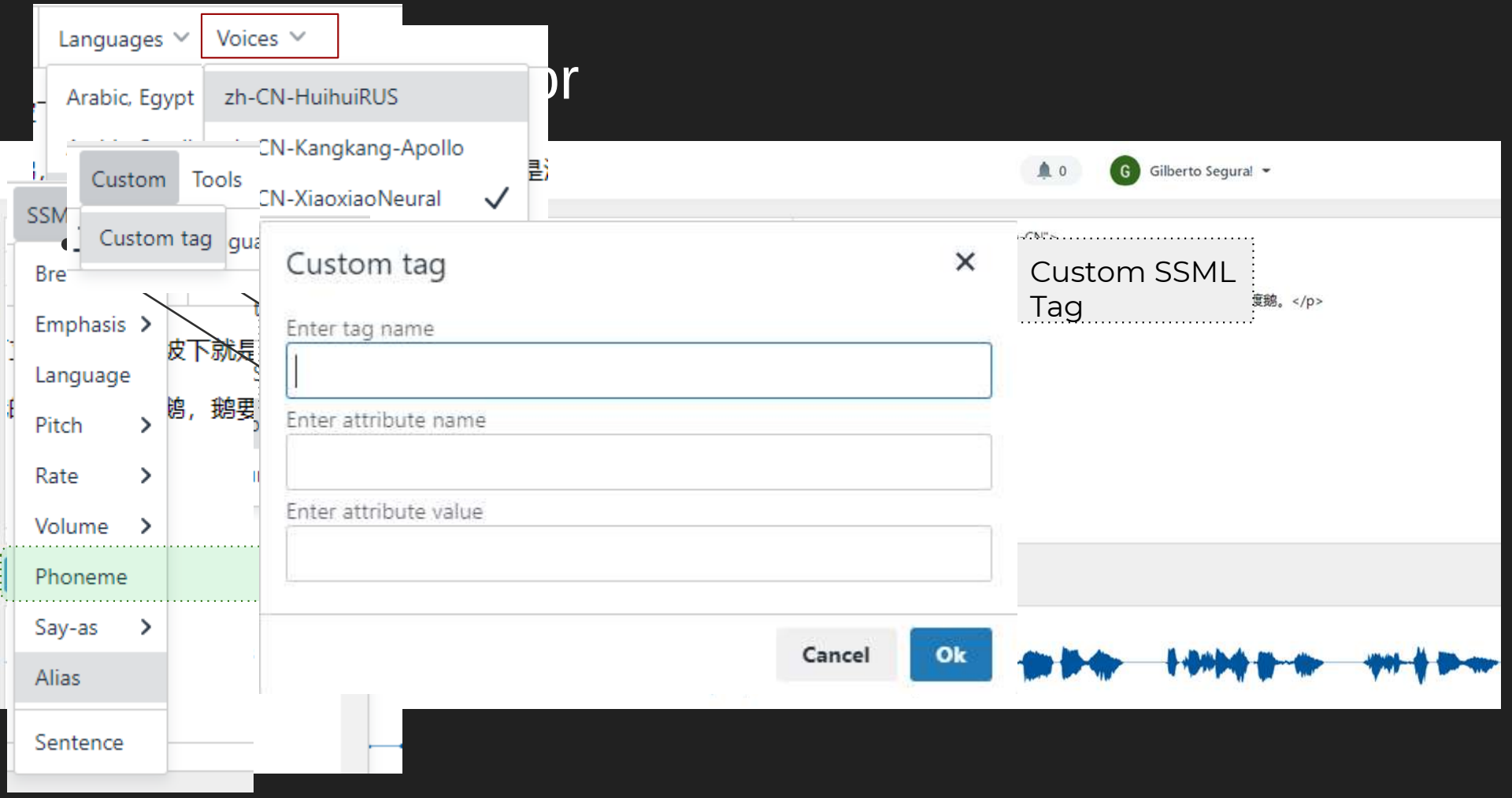
Allows you to control timing, volume, pitch, stress… Prosody

Each vendor has a slightly different implementation but there is an official standard from the W3 consortium.

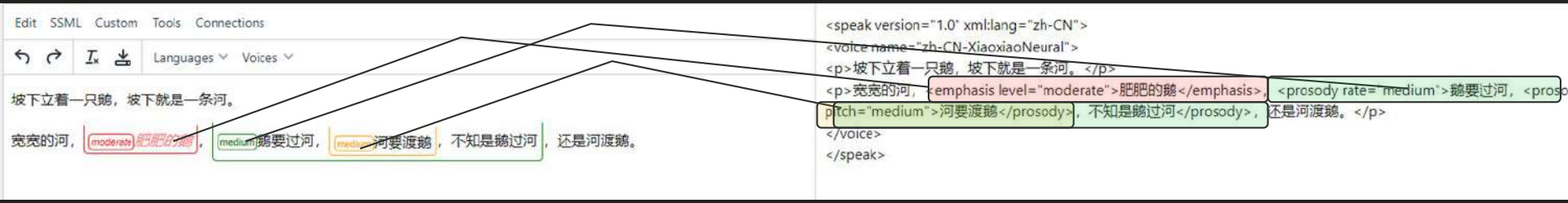
2010

https://www.w3.org/TR/speech-synthesis11/

Voxabot TTS Editor


Languages
Voices
Arabic, Egypt
zh-CN-HuihuiRUS
CN-Kangkang-Apollo
CN-XiaoxiaoNeural
Custom
Tools
Custom tag
SSM
Bre
Emphasis
Language
Pitch
Rate
Volume
Phoneme
Say-as
Alias
Sentence
Custom tag
Enter tag name
Enter attribute name
Enter attribute value
Cancel
Ok
Custom SSML Tag
Gilberto Segural
0

SSML Applied



Voxabot Demo

Working with TTS in many languages

TTS is synthesized and generated based on abstract language rules--abstract because sometimes it’s a guess.

Adding tags and punctuation can make unknown changes--and also fix defects.

Since most people don’t speak 120+ languages, you send it to a linguist who can tell you where it’s wrong.

TTS feedback: How To

Just like any feedback:

1) Be precise with replace [this] with [that]
2) If the error is phonetic as in Bass vs. Bass [fish/instrument] then spell it out like:
    a) BASSE or BASE
    b) If you have pinyin or other phonetic guides use them:

```
<speak>
      你说 <phoneme alphabet="x-amazon-pinyin" ph="bo2">薄</phoneme>。
      我说 <phoneme alphabet="x-amazon-pinyin" ph="bao2">薄</phoneme>。
</speak>
```

Main TTS providers

Amazon: AWS Polly

Microsoft: Azure Cognitive Speech Services

Google: Google Compute Cloud: Speech

Each provides a set of languages and are gradually expanding their Neural TTS offerings.

Other players exist in Canada, US and Australia which are building their own models.

The Future

Voice cloning [actors go virtual]

Customized voices [brand voice]

No Translation stage [voice to voice]

Conclusion

TTS is easy, language is hard

You can almost replace voiceover.