CGT 353 Lecture 5

Audio

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Two fundamental types

- Digital audio (sampled/recorded)
  - captured analog data that's been converted into digital form
    - wav
    - ogg
    - mp3
    - mp4
    - Mpeg
    - Etc…
  - Synthesized audio
  - MIDI files (.mid)

ogg

- It encapsulates raw compressed data and allows interleaving of audio and video data inside a convenient format.
- Designed to provide for efficient streaming and manipulation of high quality digital multimedia.
- Can multiplex a number of independent streams for audio, video, text (such as subtitles), and metadata.

Attributes of Audio

- Attributes:
  - Resolution/Sampling Rate – frequentness of samples over time
    - Controls clarity of clip
  - Bit depth – number of bits available to describe amplitude at any instance in time
    - Controls fidelity of clip
  - Channels – number of independent speaker channels

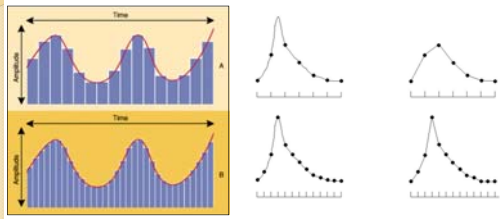
Sampling

- **Samples** refer to instances of time captured
- A digital audio file is an approximated description of multiple samples over a given period of time then described digitally
- Although not as detailed as analog, its still good enough for humans

Sampling Rate

- When sound is recorded, samples are captured at a specific, consistent interval
- How close or far apart these intervals are is called the **sampling rate**
- **Greater sampling rate = more samples captured = increased description of audio**
- So, **higher sampling rate = better audio clarity**

Sampled Audio



Synthesized Audio

- Typically refers to MIDI files in multimedia
- Describes various notes and sounds using a synthesis chip on a computer's sound card
- Because it is recreating rather than replaying sound, synthesized sound sounds "fake"

Other Issues

- Other issues related to audio:
  - Bit rate – speed of connection required for streaming to exceed download
    - Bit rate = file size / length of clip
  - Compression

Using Audio

- Audience Considerations
  - Bandwidth
  - Playback – QuickTime Player or Windows Media Player
- Optimization
  - Length of clip
  - Channels: use only 1
  - Bit depth: 8-bit versus 16-bit
  - Sampling Rate: 44 kHz, 22 kHz, 11 kHz, other…
- Applications

Measuring and Using Sound

- Audio usually measured in kHz (kilohertz)
- Sounds with a sampling rate of 44 kHz are "CD quality"
- Human ear can hear up to 20-22 kHz, so its usually not necessary to have 44 kHz on a multimedia file
- Should never go lower than 11 kHz, which is adequate for voice but not for music
- It is always best to start with high quality files then downsample them

Bit Depth

- At each captured sample, the computer has to represent the audio amplitude with a certain number of bits, described as **bit depth**
- Bit depth controls audio **fidelity or dynamic range**

Why Understand it?

- It is important to understand the basics of sound to incorporate them adequately
- If not used properly, sound files can
  - sound horrible *or*
  - be far too large
- You can use sound for a variety of things including
  - interactive navigational objects,
  - sound tracks, and
  - voiced narrative

HTML5 <audio>

```
<audio controls="controls">
  <source src="sound1.ogg" type="audio/ogg" />
  <source src="sound1.mp3" type="audio/mp3" />
  Your browser does not support the audio tag.
</audio>
```


Click link to play audio

```
<script type="text/javascript" src="js/jquery-1.7.1.js"></script>
<audio controls="controls" id="audio1">
        <source src="click.ogg" type="audio/ogg" />
        Your browser does not support the audio tag.
</audio>

<p><a href="#" class="click">Click here for sound effect</a></p>

<script type="text/javascript"><!--
$(document).ready(function(){
        $("a.click").click(function(){
                $("#audio1").attr("autoplay", "autoplay");
        });
});
--></script>
```