Du pixel aux images

Introduction au traitement numérique des images 2D – 32M7138

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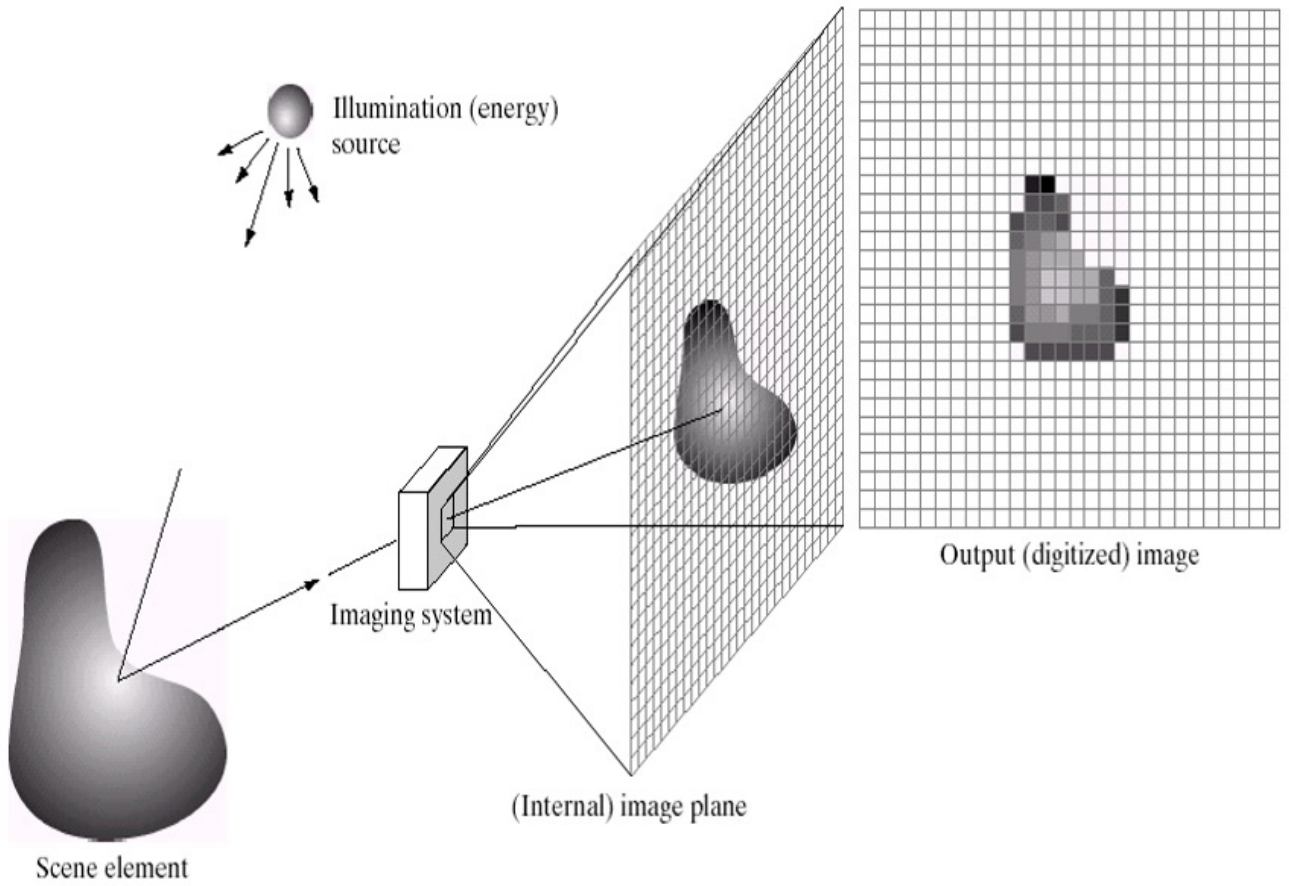
UNIVERSITÉ DE GENÈVE

Plan du cours

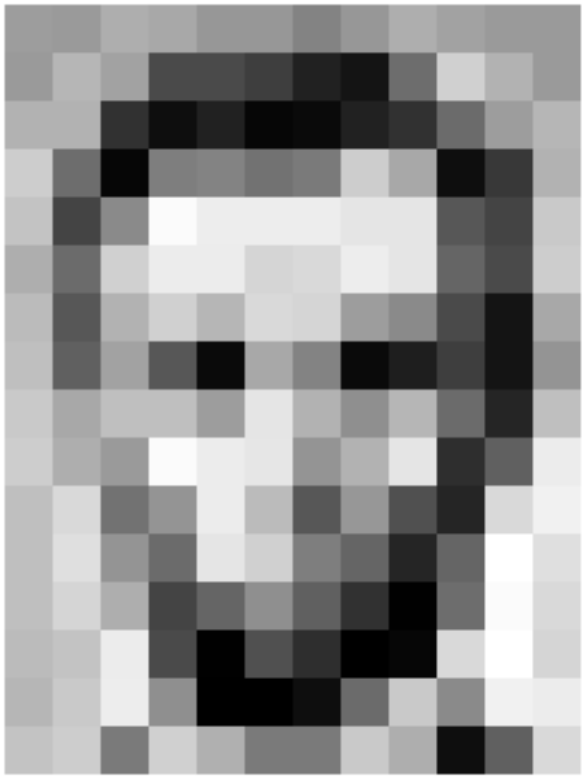
1. L’image vue par la machine
2. Le code: c’est quoi ?
3. Les outils pour le semestre
4. Initiation aux lignes de commande
5. Débuter avec Python

1. L’image vue par la machine

Acquisition des images numériques



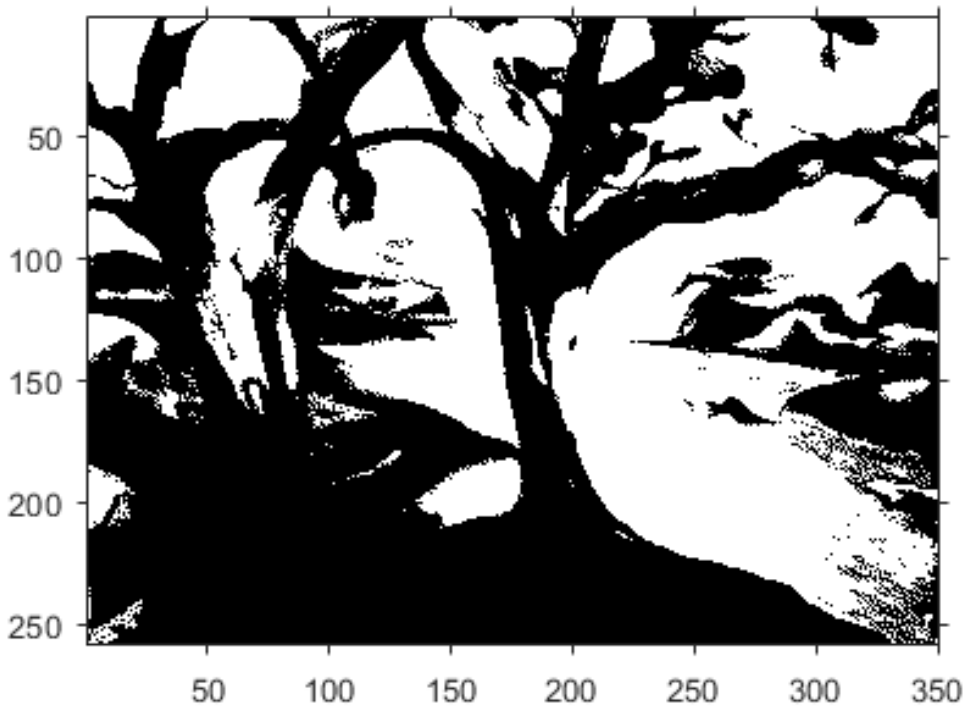
L’image numérique = matrice



157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

Image binaire



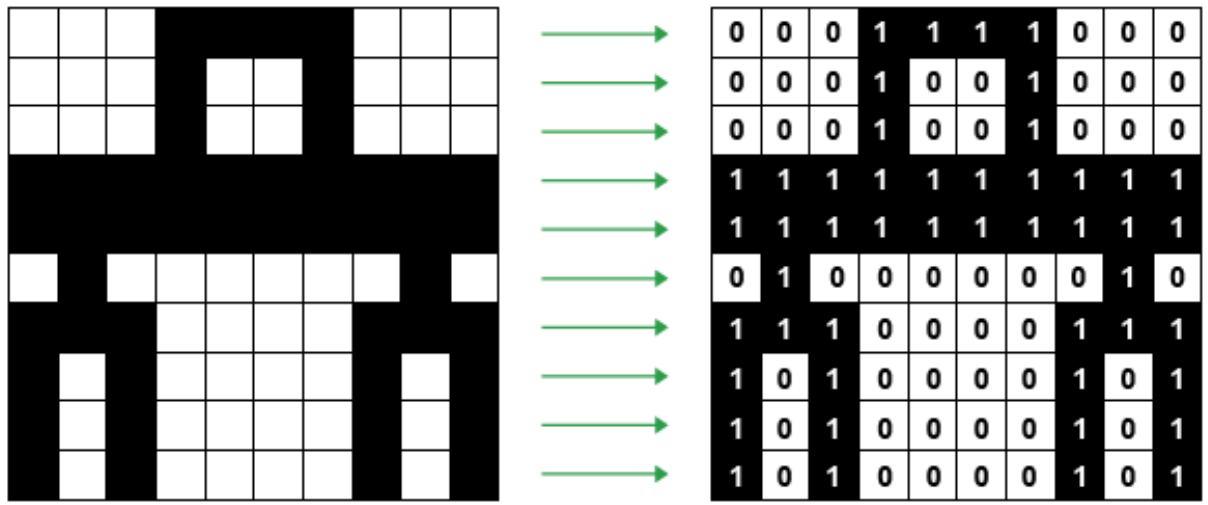
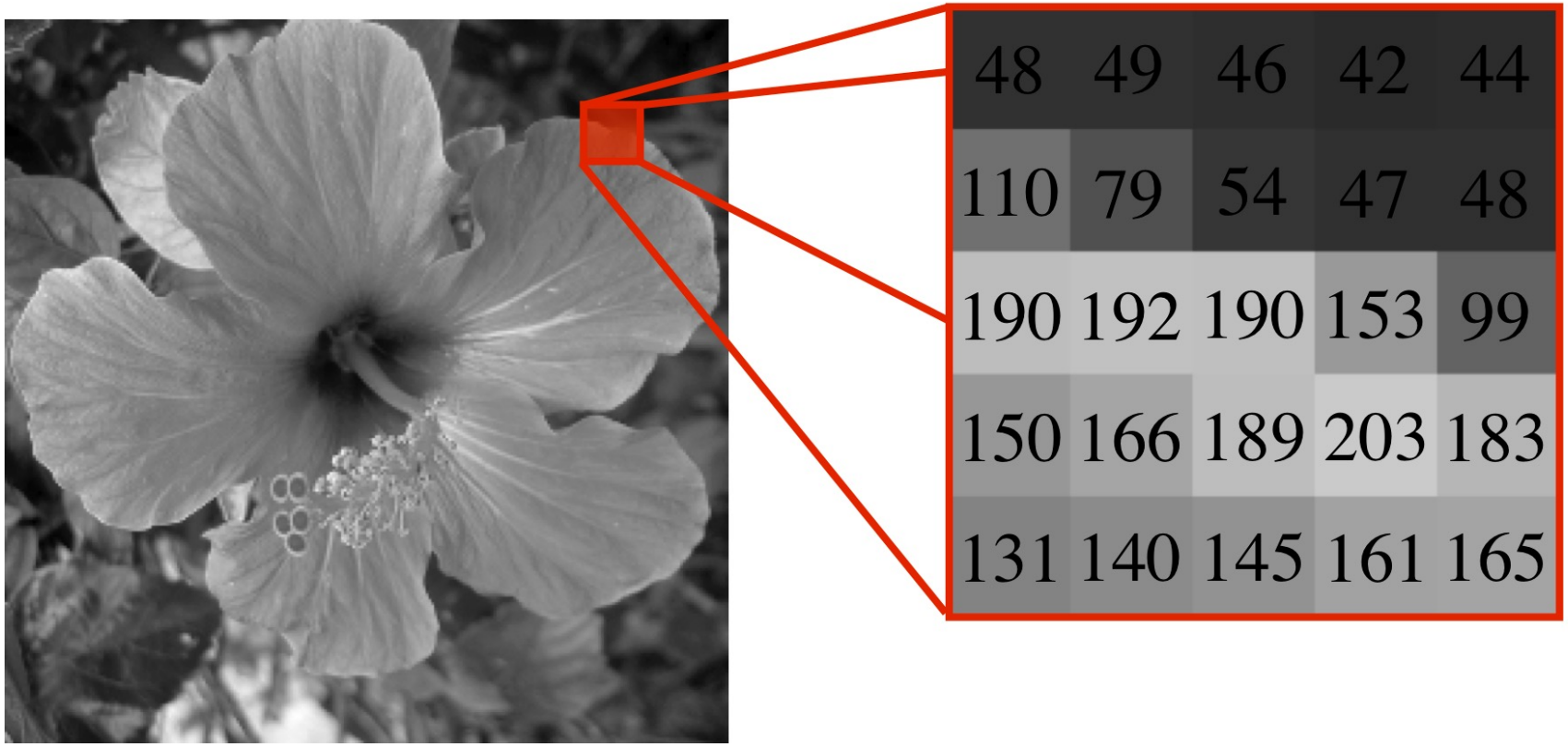
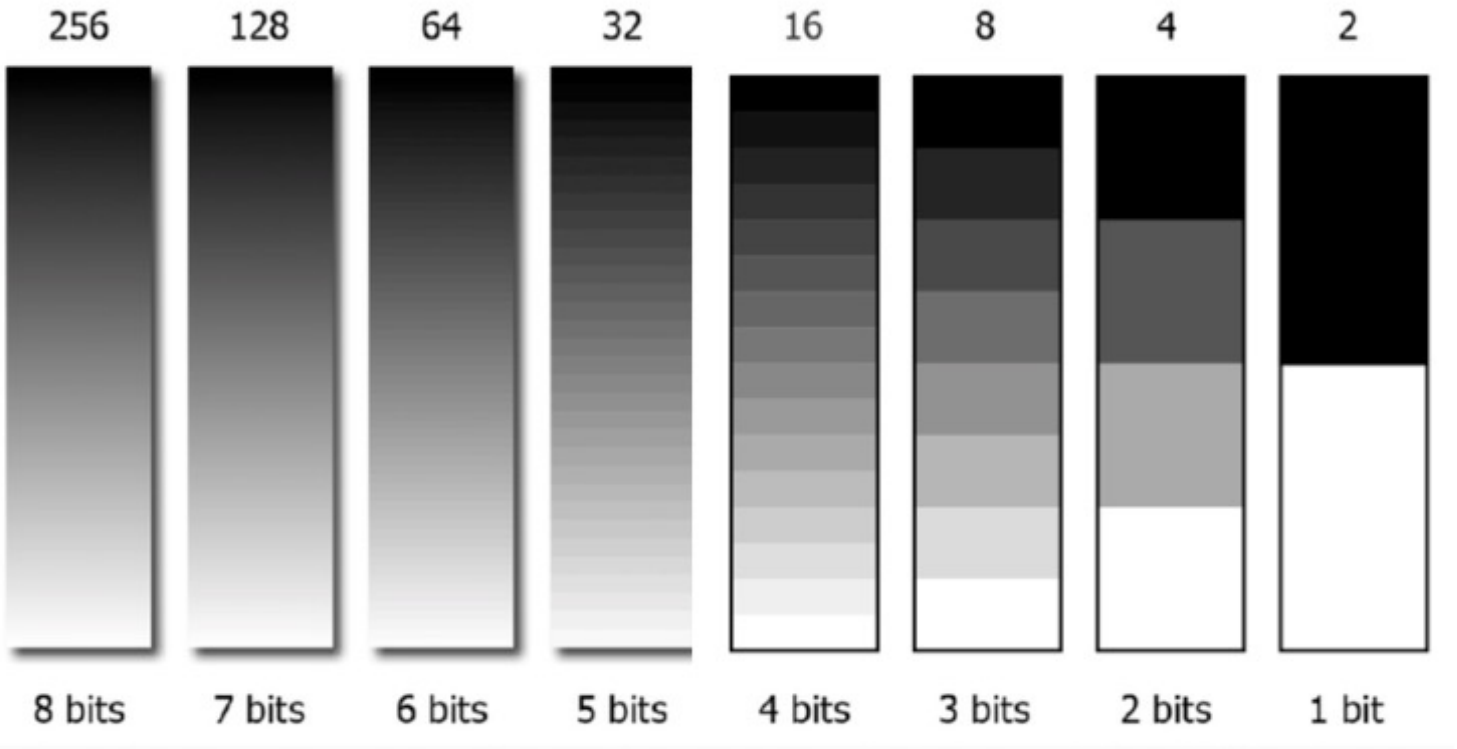


Image en valeurs de gris



Encodage des valeurs de gris



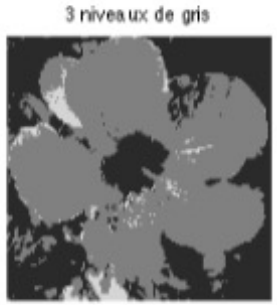
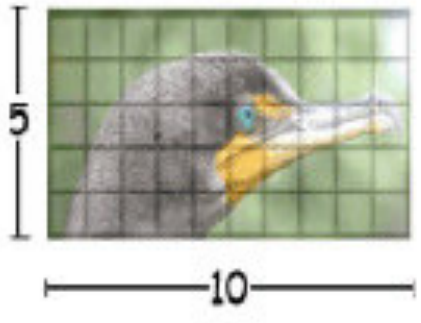
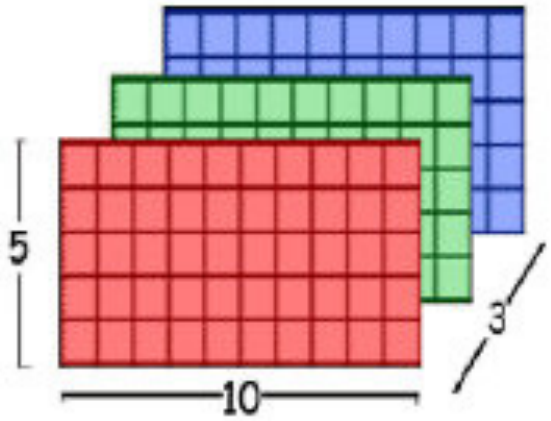


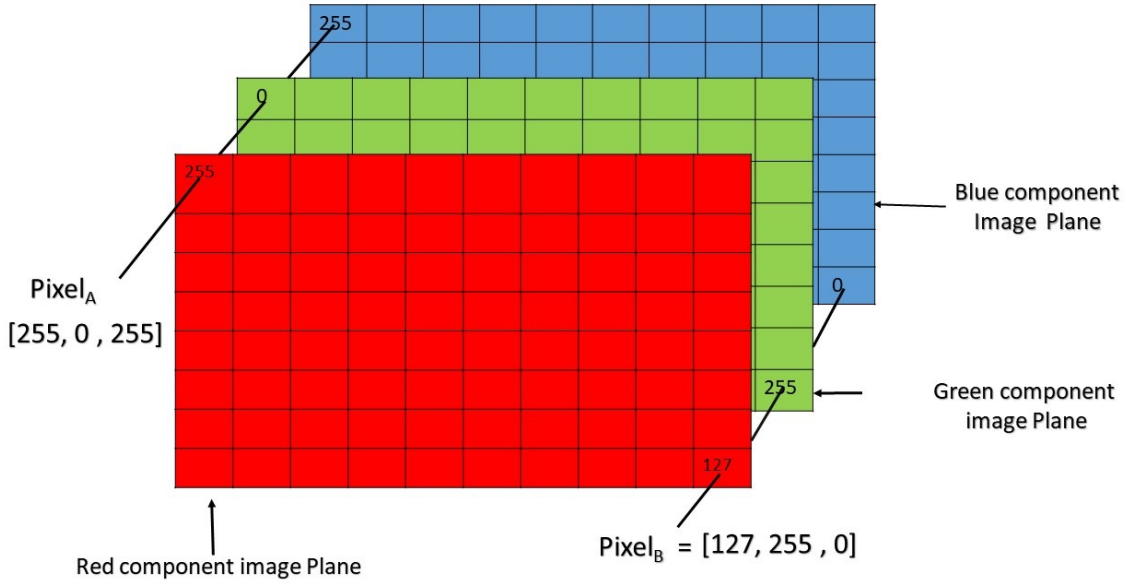
Image en couleurs



Original Color Image

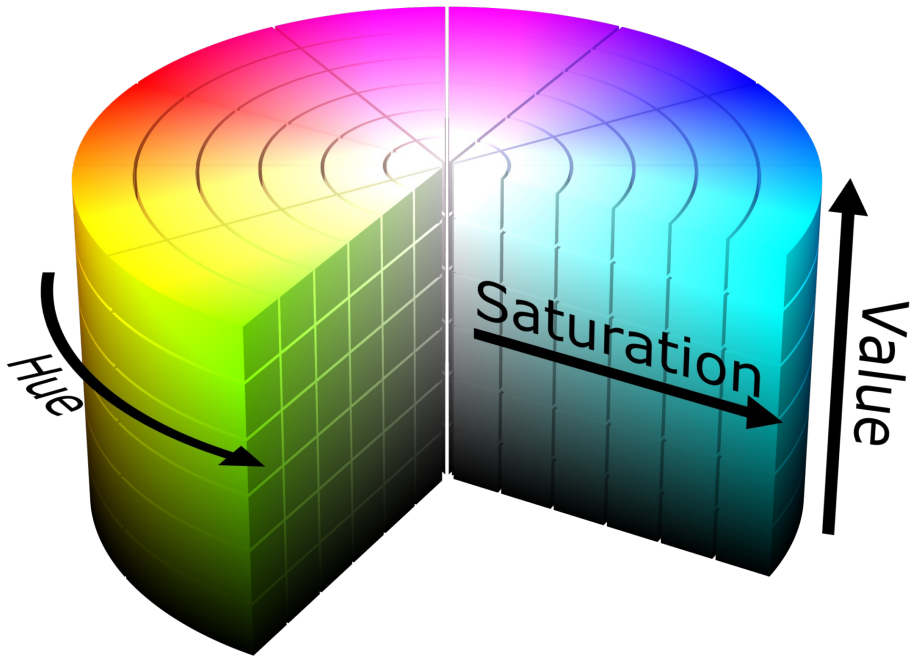


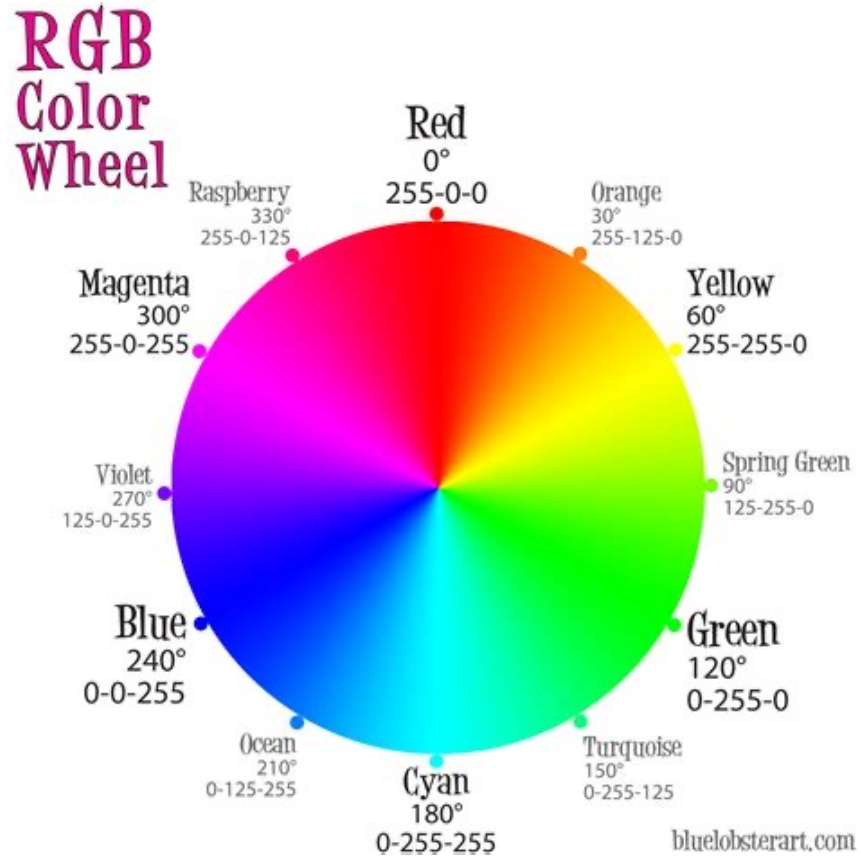
RGB Matrix



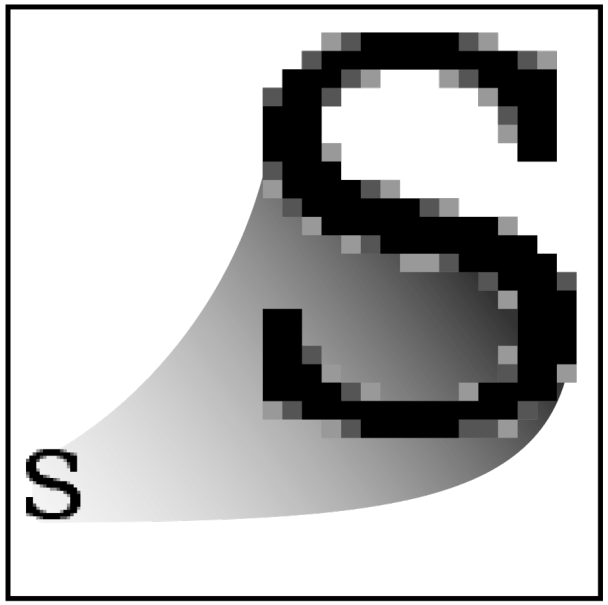
Pixel of an RGB image are formed from the corresponding pixel of the three component images

Encodage des couleurs



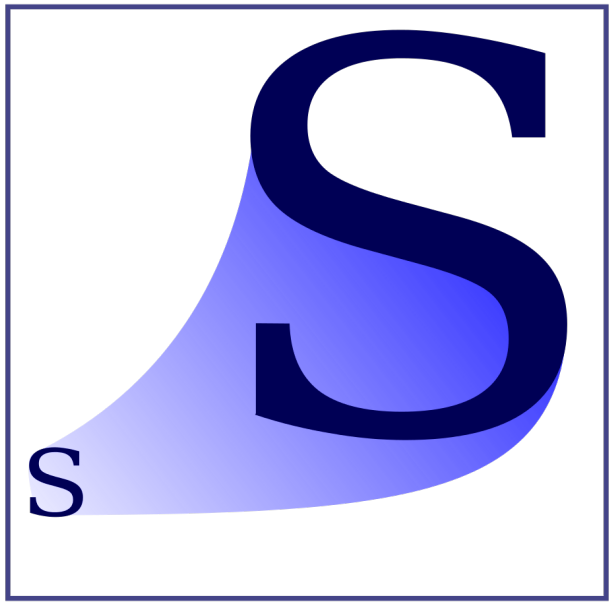


Formats des images numériques



Raster

.jpeg .gif .png



Vector

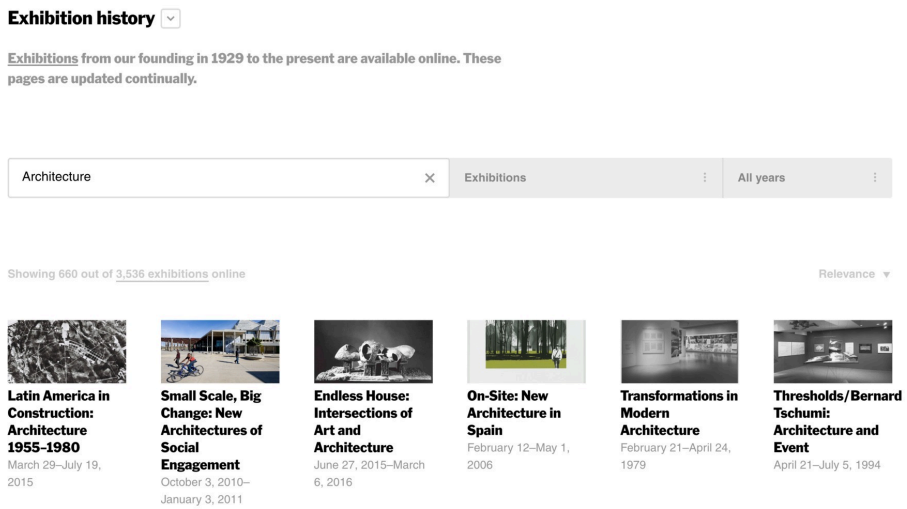
.svg

Où trouver des images numériques ?

- Sources privées
  - Données personnelles
  - Données numérisées

Où trouver des images numériques ?

- Sources publiques : musées



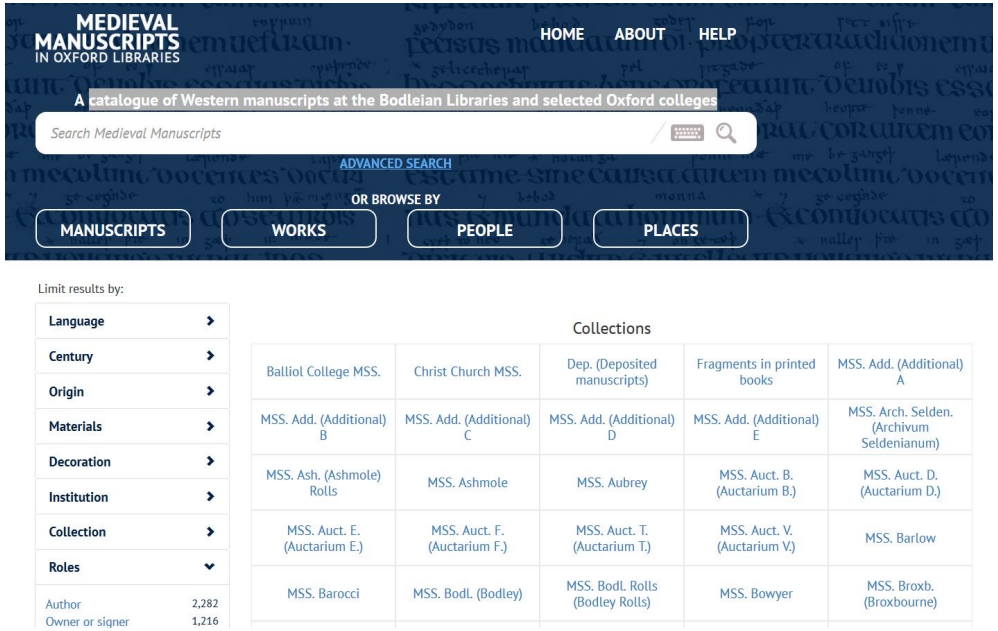
Où trouver des images numériques ?

- Sources publiques : institutions

{BnF

Gallica

BIBLIOTHÈQUE NUMÉRIQUE



Où trouver des images numériques ?

- Sources publiques : sites spécialisés

2. Le code: c'est quoi?

Python: c’est quoi ?

```
1  import unittest
2  import quotes
3
4  class MyTests(unittest.TestCase):
5
6      def test_add_get_quote(self):
7          quotes.add("Confucius", "A journey of a thousand miles ...  ")
8          q = quotes.get("Confucius", contains="step")
9          self.assertEqual(q, ["A journey of a thousand miles ...  "])
10
11     def test_add_get_quote_no_contains(self):
12         quotes.add("Confucius", "A journey of a thousand miles ...  ")
13         q = quotes.get("Confucius")
14         self.assertEqual(q, ["A journey of a thousand miles ...  "])
15
16 if __name__ == "__main__":
17     unittest.main()
```

Python: pourquoi ?

- Utilisation facilitée
- Tous niveaux
- Polyvalent
- Courant
- Développé

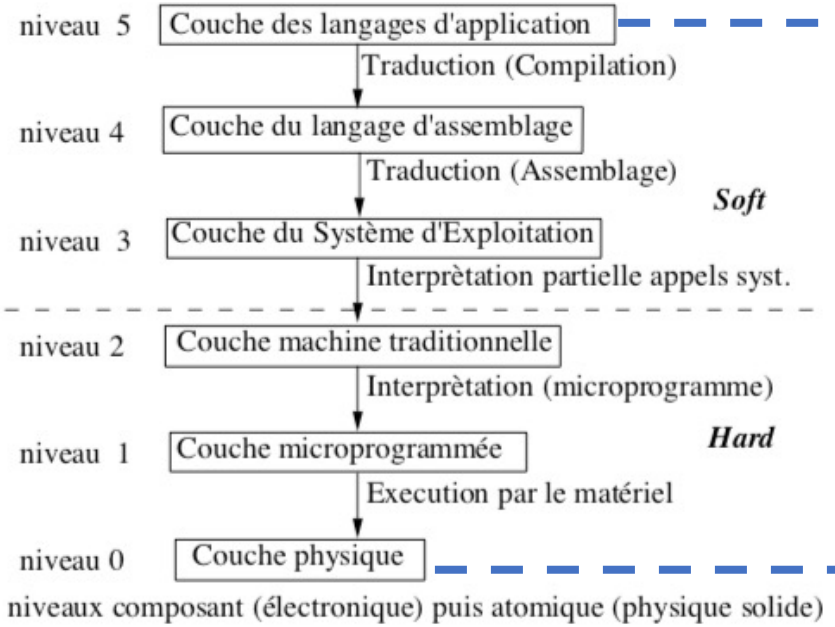
Python: liens utiles

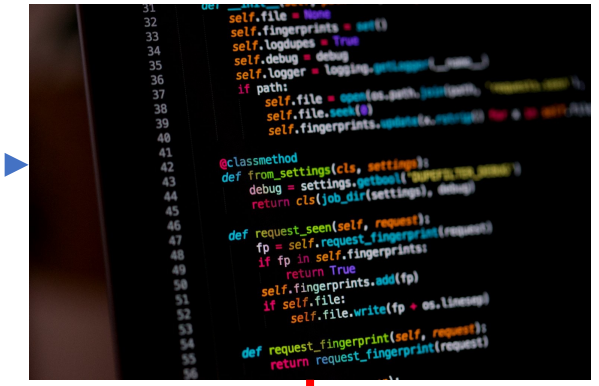
- Tutoriels
  - W3schools
  - Openclassrooms
  - Python docs
- Conventions : PEP8
- Aide
  - Docs, ?Fonction
  - Stackoverflow, Github, ChatGPT

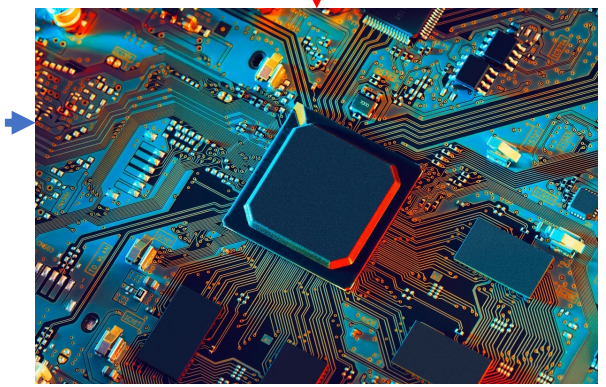
Langages de programmation

Top 10 Programming Languages	Python	C	Java	C++	C#	R	JavaScript	PHP	Go	Swift
Paradigm	Multi-paradigm: object-oriented, imperative, functional, procedural, reflective	Imperative (procedural), structured	Multi-paradigm: object-oriented (class-based), structured, imperative, generic, reflective, concurrent	Multi-paradigm: procedural, functional, object-oriented, generic	Multi-paradigm: structured, imperative, object-oriented, event-driven, task-driven, functional, generic, reflective, concurrent	Multi-paradigm: array, object-oriented, imperative, functional, procedural, reflective	Multi-paradigm: object-oriented (prototype-based), imperative, functional, event-driven	Imperative, object-oriented, procedural, reflective	Compiled, concurrent, imperative, structured	Multi-paradigm: protocol-oriented, object-oriented, functional, imperative, block-structured
Designed by	Guido van Rossum	Dennis Ritchie	James Gosling	Bjarne Stroustrup	Microsoft	Ross Ihaka and Robert Gentleman	Brendan Eich	Rasmus Lerdorf	Robert Griesemer, Rob Pike, Ken Thompson	Chris Lattner and Apple Inc
Developer	Python Software Foundation	Dennis Ritchie & Bell Labs (creators), ANSI X3J11 (ANSI C), ISO/IEC	Sun Microsystems (now owned by Oracle corporation)	Bell Labs	Microsoft	R Core Team	Netscape Communications Corporation, Mozilla Foundation, Ecma International	The PHP Development Team, Zend Technologies	Google Inc.	Apple Inc
First appeared	20 February 1991 (26 years ago)	1972 (45 years ago)	May 23 1995 (22 years ago)	1983 (34 years ago)	2000 (17 years ago)	August 1993 (24 years ago)	December 4, 1995 (21 years ago)	June 8, 1995 (22 years ago)	November 10, 2009 (7 years ago)	June 2, 2014 (3 years ago)
Typing discipline	Duck, dynamic, strong	Static, weak, manifest, nominal	Static, strong, safe, nominative, manifest	Static, nominative, partially inferred	Static, dynamic, strong, safe, nominative, partially inferred	Dynamic	Dynamic, duck	Dynamic, weak, gradual (as for PHP 7.0.0)	Strong, static, inferred, structural	Static, strong, inferred
Platform	Cross-platform	Cross-platform	Windows, Solaris, Linux, OS X	Linux, MacOS, Solaris	Common Language Infrastructure	UNIX platforms, Windows, MacOS	Cross-platform	Unix-like, Windows	Linux, macOS, FreeBSD, NetBSD, OpenBSD, Windows, Plan 9, DragonFly BSD, Solaris	Darwin, Linux, FreeBSD
Filename extensions	.py, .pyc, .pyo (prior to 3.5), .pyw, .pyz (since 3.5)	.c, .h	.java, .class, .jar	.cc, .cpp, .C, c++, .h, .hh, .hpp, .hxx, .h++	.cs	.r, .R, .RData, .rds, .rda	.js	.php, .phtml, .php3, .php4, .php5, .php7, .phps	.go	.swift

Et Python sur ma machine ?







4. Les outils pour ce semestre

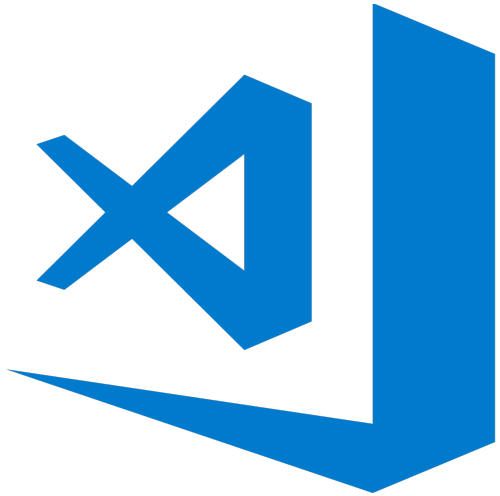
Jupyter lab

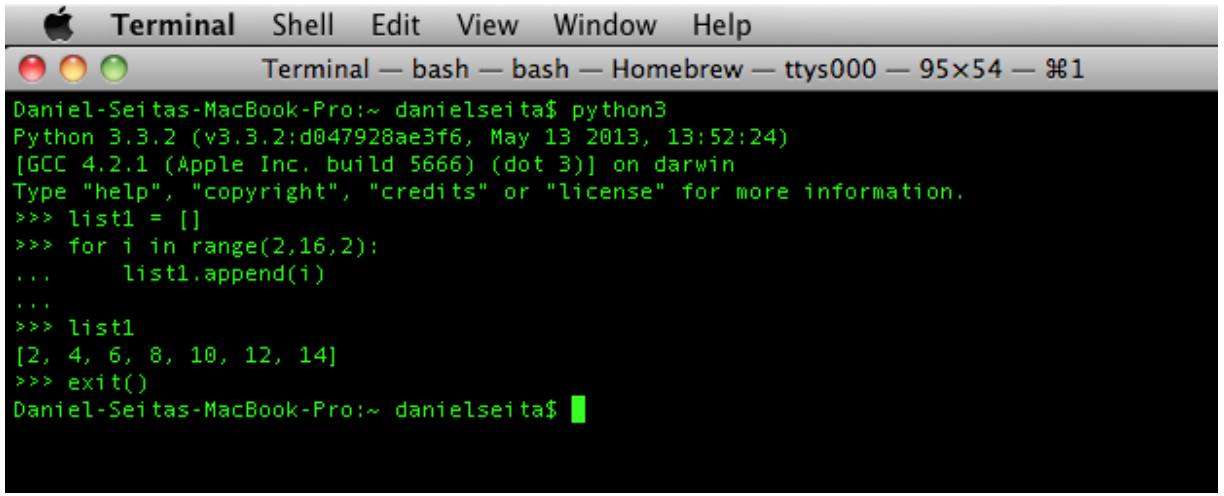
Jupyter hub

https://humanities.jupyterhub.unige.ch/

Google Colab

D’autres environnements



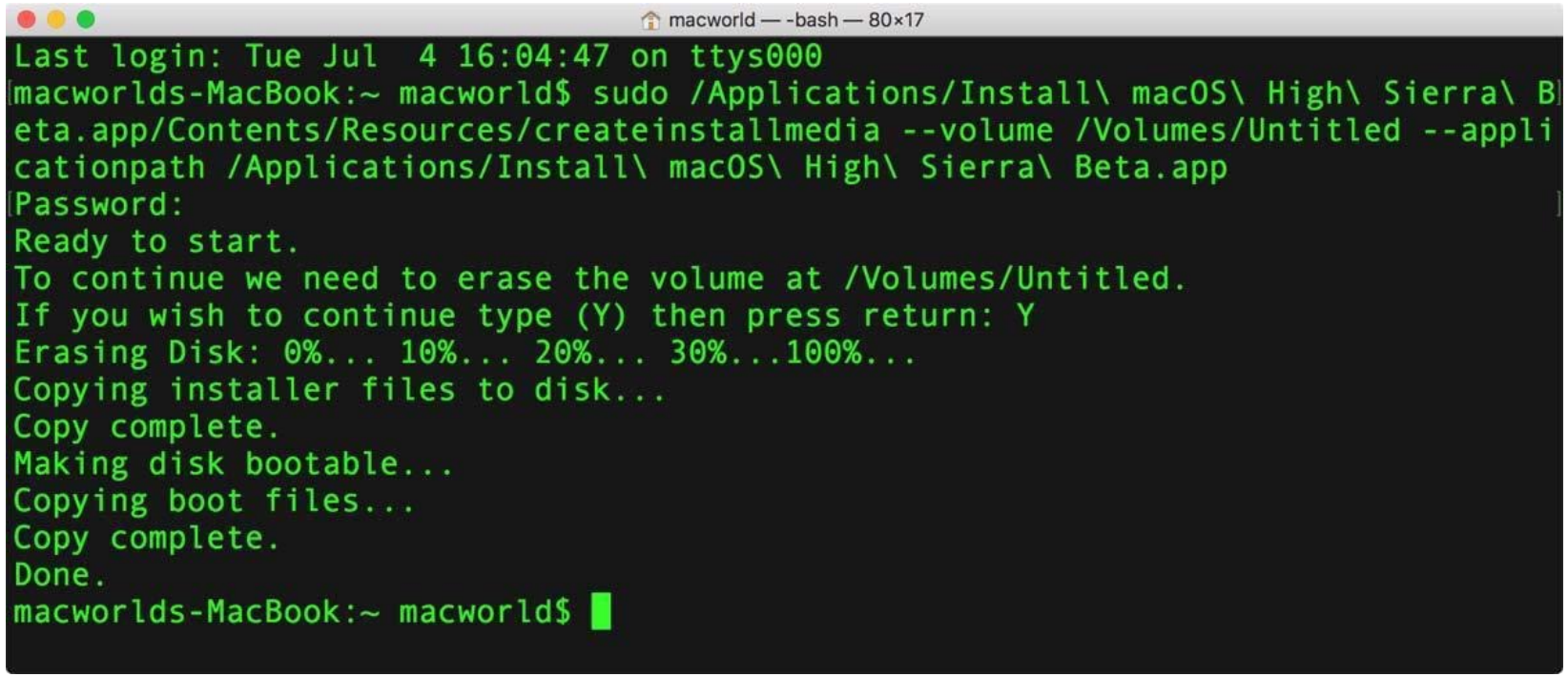


D’autres environnements

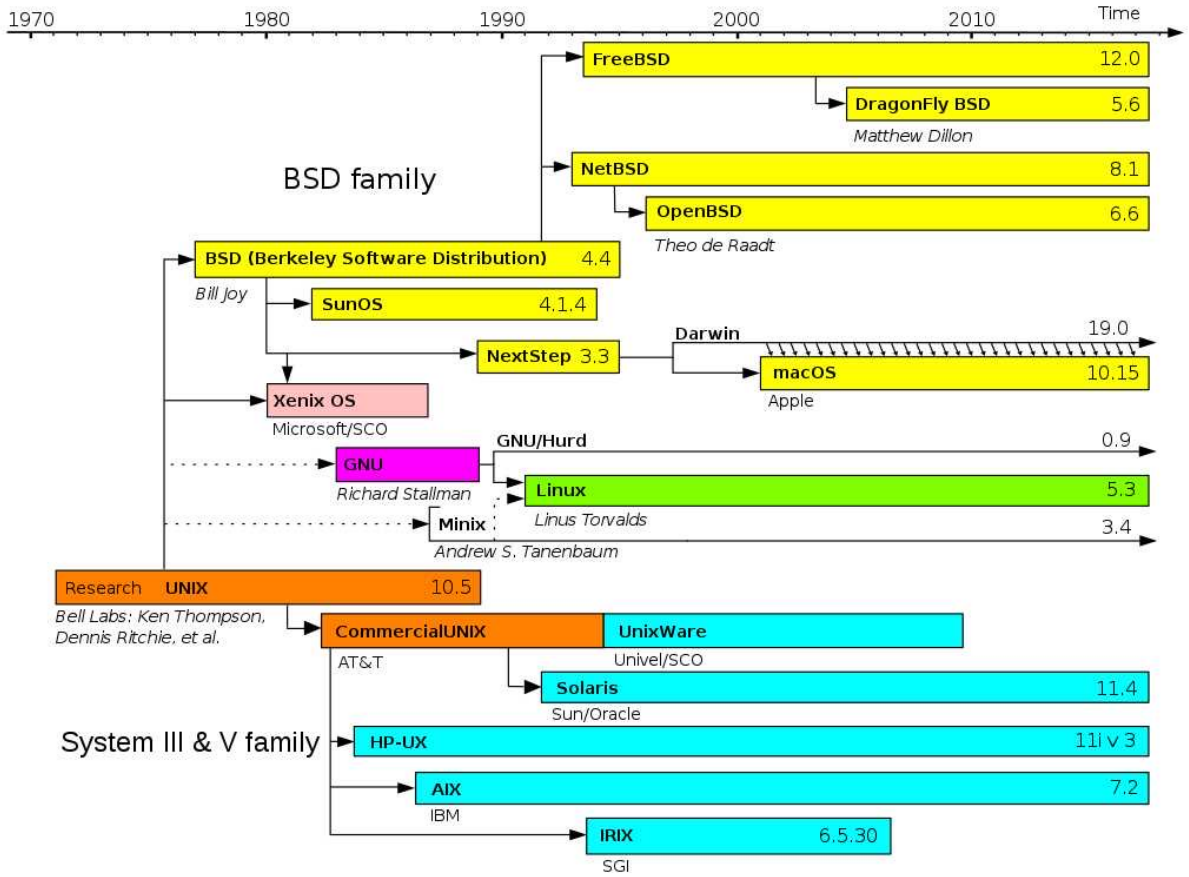
- Installation Anaconda et Jupyter Lab ?

4. Initiation aux lignes de commande

Une invite de commande



Des mondes plus ou moins séparés



Les lignes de commande

1. ls
2. cd
3. mkdir +nom
4. rm +nom
5. pwd
6. touch + nom

1. dir
2. cd
3. mkdir +nom
4. del +nom
5. cd
6. echo some_text > hello_world.rb

Chemins

- Chemin relatif
- Chemin absolu

5. Débuter avec Python

Un peu de scraping

Jupyter Hub + https://github.com/phenakistiscope/cours_32M7138

Exercez-vous!

https://www.w3schools.com/python/