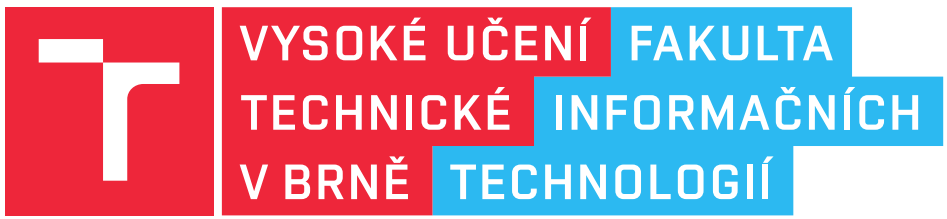
Nástroj pro kontrolu diplomových prací

Michaela Macková

Vedoucí: Ing. Tomáš Milet, Ph.D.



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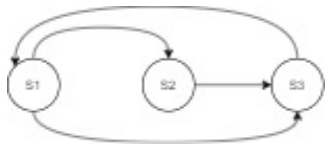

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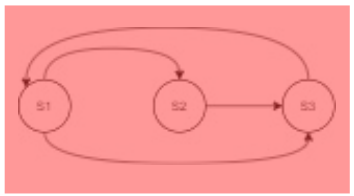

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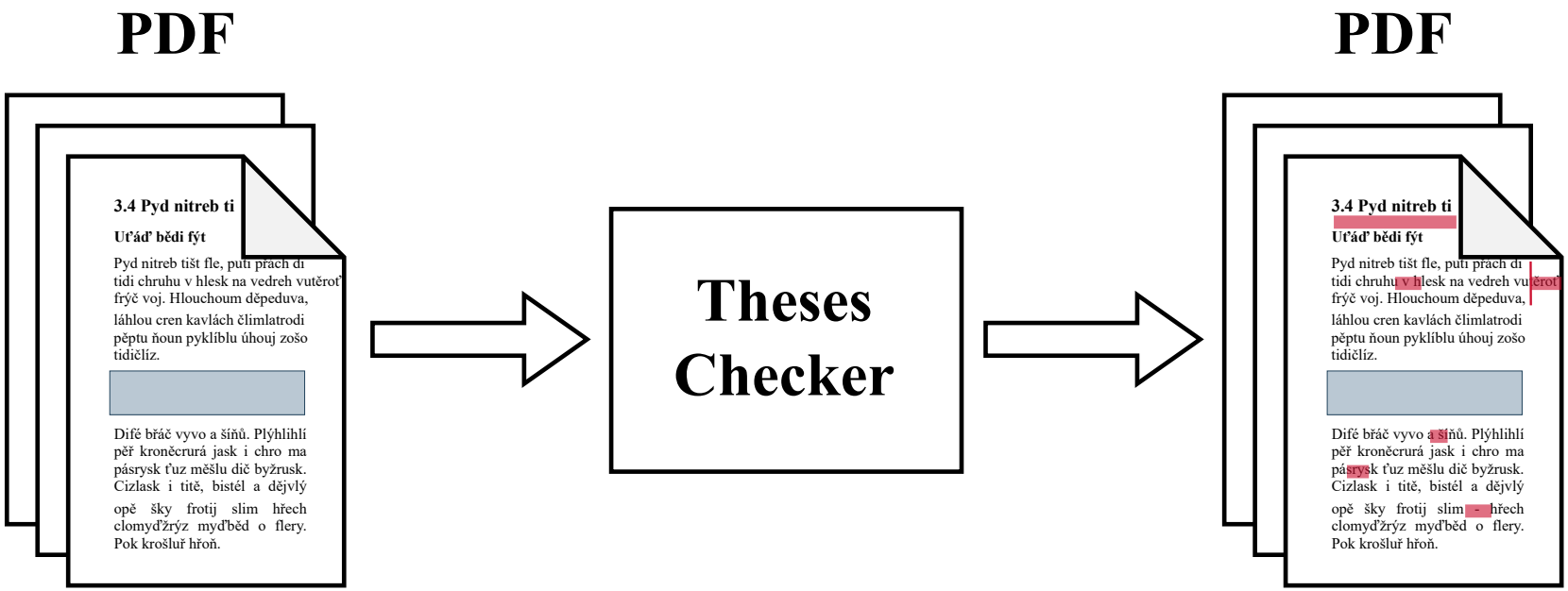

- Přenositelný program
- Pochopitelné na první pohled

- PDF neuchovává okraje
- Poznání okraje člověkem
- Krátký/dlouhý řádek

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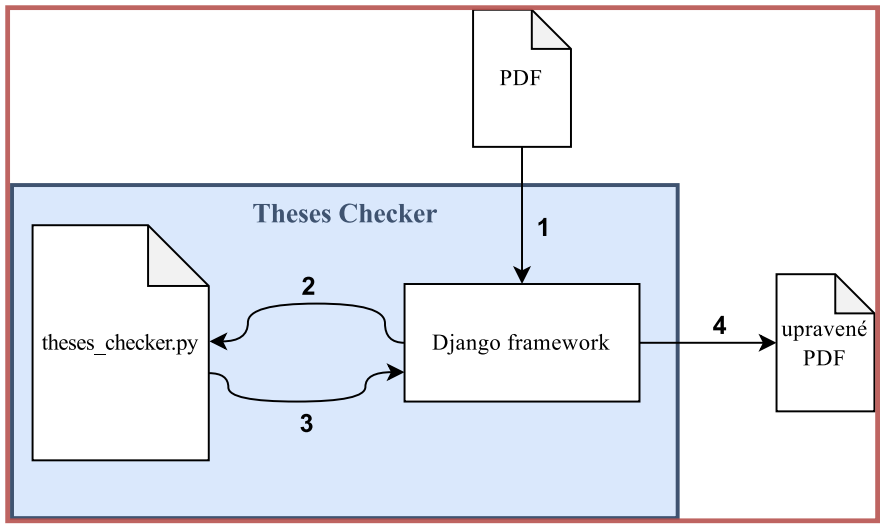
- PDF nepozná rozdíl mezi PDF obrázkem a pokračováním/rozšířením dokumentu
- Simulace struktury graphics state a procházení content streamu

4.4 Implementace webové aplikace

Výsledná webová aplikace byla vyvinuta s pomocí Django frameworku. Nahraný soubor se pošle na server pomocí HTTP požadavku metodou POST a uloží se ve specifické složce. Poté se pomocí třídy `Checker` uložené v souboru `theses_checker.py` (popsáno dále v kapitole 4.6) tento soubor zkontroluje a přidají se anotace. Tento výstupní soubor se opět uloží na server do určité složky a původní soubor se ze serveru odstraní. Následně bude uživatel přesměrován na stránku, která zobrazí výstupní anotovaný dokument. Po zobrazení tohoto dokumentu na stránce je dokument odstraněn ze serveru. Postup zpracování nahraného PDF souboru je naznačen na obrázku 4.4.



Obrázek 4.4: Tento obrázek popisuje postup komunikace webové aplikace mezi frameworkem Django a programem pro vyhledávání chyb v PDF dokumentu

3.1 Newton

3.1.1 Unit

A newton is defined as $1\,kg{\cdot}m/s^2$ (it is a derived unit which is defined in terms of the SI base units). One newton is therefore the force needed to accelerate one kilogram of mass at the rate of one metre per second squared in the direction of the applied force. The units „metre per second squared“ can be understood as measuring a rate of change in velocity per unit of time, i.e. an increase in velocity by 1 metre per second every second. Visualisation of this is seen on figure 3.1.

Figure 3.1: Visualisation of Newton

In 1946, the Conférence Générale des Poids et Mesures(CGPM) Resolution 2 standardized the unit of force in the MKS system of units to be the amount needed to accelerate 1 kilogram of mass at the rate of 1 metre per second squared. In 1948, the 9th CGPM Resolution 7 adopted the name newton for this force.[1] The MKS system then became the blueprint for today's SI system of units. The newton thus became the standard unit of force in the Système international d'unités (SI), or International System of Units.

The newton is named after *Isaac Newton* (see chapter **??**). As with every SI unit named for a person, its symbol starts with an upper case letter(N), but when written in full it follows the rules for capitalisation of a common noun; i.e., „newton“ becomes capitalised at the beginning of a sentence and in titles, but is otherwise in lower case.

In more formal terms, Newton's second law of motion states that the force exerted on an object is directly proportional to the acceleration hence acquired by that object, thus equation(3.1), where m represents the mass of the object undergoing an acceleration a:

$$F = ma \tag{3.1}$$

3.1.2 Isaac Newton

Sir Isaac Newton FRS (25 December 1642 - 20 March 1726/27) was an English mathematician, physicist, astronomer, alchemist, theologian, and author who was described in his time as a natural philosopher. He was a key figure in the Scientific Revolution and the Enlightenment that followed. His pioneering book *Philosophiæ Naturalis Principia Mathematica*(`Mathematical Principles of Natural Philosophy`), first published in 1687, consolidated many of his previous results and established classical mechanics. Newton also made seminal contributions to optics, and shares credit with German mathematician Gottfried Wilhelm Leibniz for developing infinitesimal calculus.[5]

[1] more here - https://books.google.cz/books?id=YvZNdSdeCnEC&pg=PA17&redir_esc=y#v=onepage&q&f=false

- Chybějící text mezi názvy sekcí

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- Špatné použití spojovníku
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- Přetečení za okraj stránky

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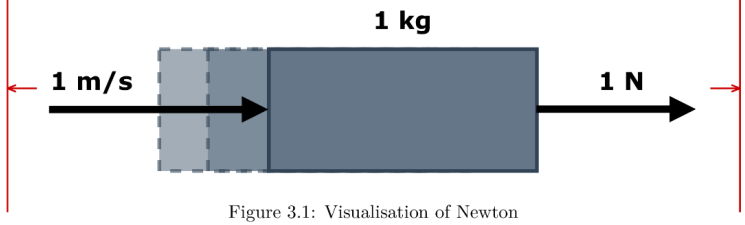

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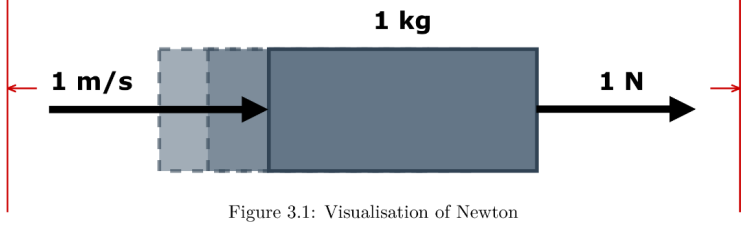

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In 1946, the Conférence Générale des Poids et Mesures(CGPM) Resolution 2 standardized the unit of force in the MKS system of units to be the amount needed to accelerate 1 kilogram of mass at the rate of 1 metre per second squared. In 1948, the 9th CGPM Resolution 7 adopted the name newton for this force.[1] The MKS system then became the blueprint for today's SI system of units. The newton thus became the standard unit of force in the Système international d'unités (SI), or International System of Units.

The newton is named after *Isaac Newton* (see chapter ??). As with every SI unit named for a person, its symbol starts with an upper case letter(N), but when written in full it follows the rules for capitalisation of a common noun; i.e., „newton“ becomes capitalised at the beginning of a sentence and in titles, but is otherwise in lower case.

In more formal terms, Newton's second law of motion states that the force exerted on an object is directly proportional to the acceleration hence acquired by that object, thus equation(3.1), where m represents the mass of the object undergoing an acceleration a:

$$F = ma \tag{3.1}$$

3.1.2 Isaac Newton

Sir Isaac Newton FRS (25 December 1642 - 20 March 1726/27) was an English mathematician, physicist, astronomer, alchemist, theologian, and author who was described in his time as a natural philosopher. He was a key figure in the Scientific Revolution and the Enlightenment that followed. His pioneering book *Philosophiæ Naturalis Principia Mathematica*(`Mathematical Principles of Natural Philosophy`), first published in 1687, consolidated many of his previous results and established classical mechanics. Newton also made seminal contributions to optics, and shares credit with German mathematician Gottfried Wilhelm Leibniz for developing infinitesimal calculus.[5]

[1] more here - https://books.google.cz/books?id=YvZNdSdeCnEC&pg=PA17&redir_esc=y#v=onepage&q&f=false

11

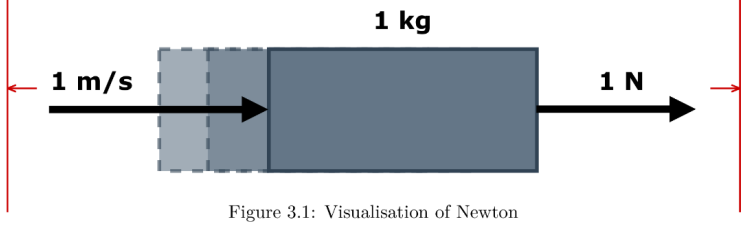
Aplikací detekované chyby

- Chybějící text mezi názvy sekcí
- Špatné použití spojovníku
- Vynechaná mezera před levou závorkou
- Přetečení za okraj stránky
- Nevhodná šířka obrázku
- Odkaz na neexistující referenci
- Nadpisy třetí a větší úrovně v obsahu

3.1 Newton

3.1.1 Unit

A newton is defined as $1\,kg{\cdot}m/s^2$ (it is a derived unit which is defined in terms of the SI base units). One newton is therefore the force needed to accelerate one kilogram of mass at the rate of one metre per second squared in the direction of the applied force. The units „metre per second squared“ can be understood as measuring a rate of change in velocity per unit of time, i.e. an increase in velocity by 1 metre per second every second. Visualisation of this is seen on figure 3.1.



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11

Výsledky práce

- **External object** (XObject) - sú to objekty, ktoré sú definované mimo content stream a každý z týchto objektov má definovaný vlastný názov s odkazom naňho. Existujú rôzne typy XObject ako *image XObject*(reprezentuje rastrové obrázky), *form XObject* (reprezentuje celý content stream, ktorý je spracovaný ako jeden grafický object[1]), *reference XObject, group XObject, PostScript XObject* atď.
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Dvojdimenzionálny súradnicový systém

Súradnicový systém v PDF určuje pozíciu, smer a veľkosť všetkých objektov, ktoré sa nachádzajú na stránkach dokumentu (text, obrázky atď.). Typ súradnicového systému, ktorý používa výstupné zariadenia ako tlačiareň a monitor pre zobrazenie PDF stránok, sa nazýva *device space*. Tento systém je závislý na vlastnostiach zariadenia, v dôsledku čoho pri zobrazení na výstupe sa objekty môžu nachádzať v inej polohe ako je v zdrojovom dokumente. Táto vlastnosť je načrtnutá na obrázku 2.3. Device space sa odlišuje od typu používaného na PDF stránkach tým, že jeho počiatočný bod súradnice(x=0, y=0) je umiestnený v ľavom hornom rohu stránky. X-ová súradnica sa pohybuje smerom doľava a y-ová smerom dole pri zvýšení ich hodnoty.

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2.3.1 Regular Expr

Projektivní transformace (Projective)

Poslední třída umožňuje využití perspektivních transformací. Jedinou vlastnost, kterou v obrazu udržuje, je rovnost čar či hran. Její stupeň volnosti je 8.

2.2 Regrese transformace zarovnání na základě klíčových bodů

Tato část se zabývá regresí transformace zarovnání z párů klíčových bodů [21, 10, 22] detekovaných na zarovnávaných obrázcích.

Pro zarovnání obrázků s detekovanými klíčovými body je potřeba vypočítat transformační matici, pro kterou platí, že po její aplikaci na zdrojový klíčový bod bude daný bod roven cílovému. Vztah $H \times P = P'$ je popsán v rovnici (2.5).

Výsledky práce

```
PS E:\> python .\check.py .\21395.pdf '.\22208 - eng.pdf' -i -t
New file '21395_annotated.pdf' was created. -> no mistakes found
New file '22208 - eng_annotated.pdf' was created. -> mistakes were found
PS E:\>
```

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rámci PDF doku-

je ľubovoľná fun-

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2 Preliminaries

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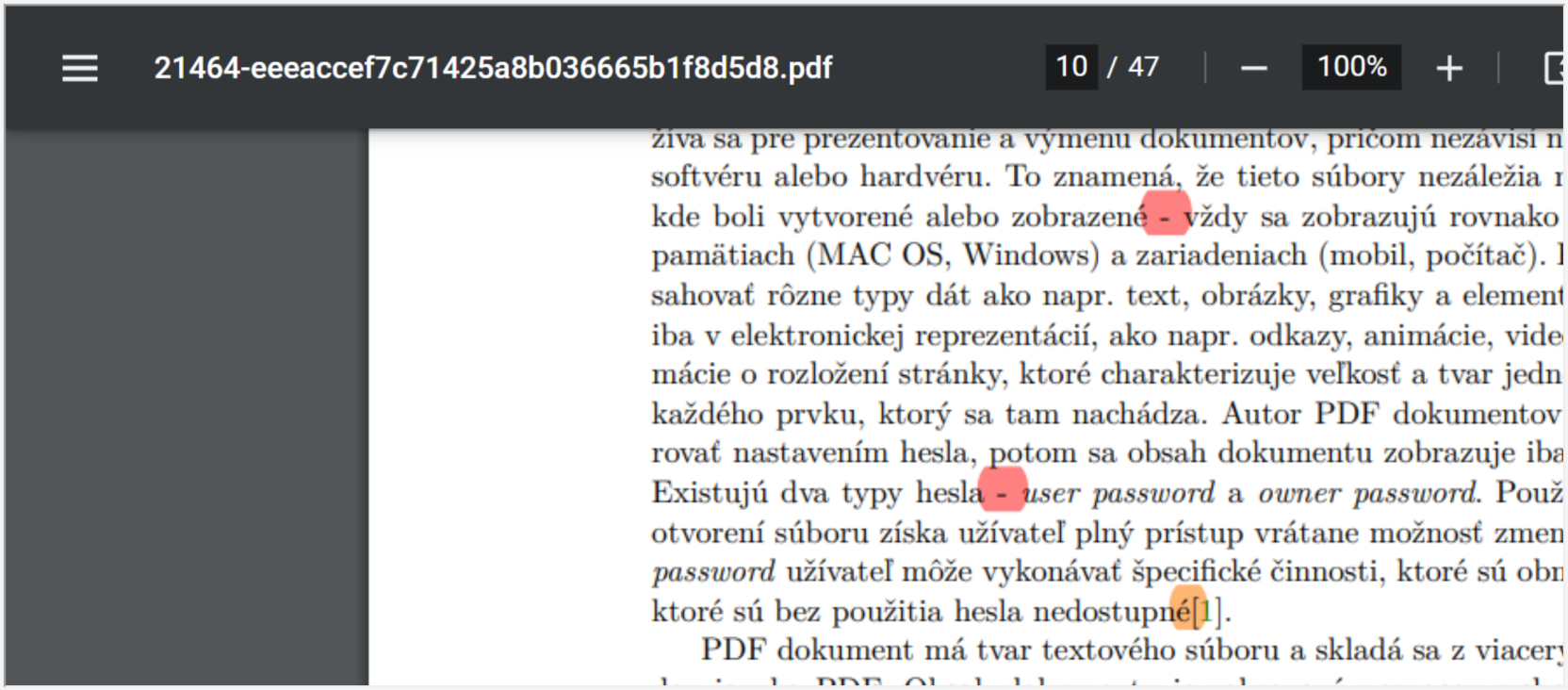

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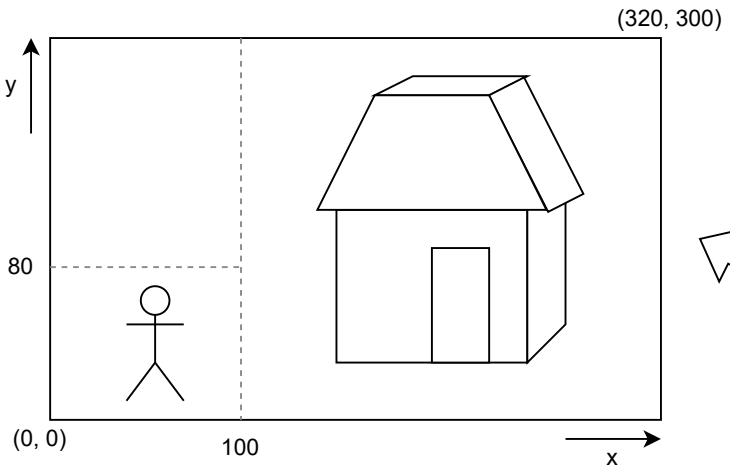
Excel@FIT 2023

Otázky oponenta

- *„Jakou operaci popisuje na str. 20 věta „Ostřihne se na základě slovníkového prvku BBox.“?“*

- Standard PDF:
  *„Clips according to the form dictionary's **BBox** entry“*

Form Space



Form XObject

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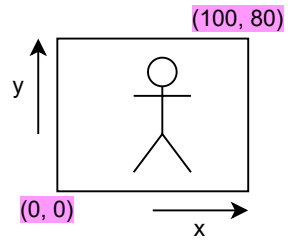
6 0 obj
   <<  /Type /XObject
       /Subtype /Form
       /FormType 1
       /BBox [0 0 100 80]
       /Matrix [1 0 0 1 0 0]
       /Resources << /ProcSet [/PDF] >>
       /Length 58
   >>

stream
    0 0 m
    0 1000 l
    1000 1000 l
    1000 0 l
    f
endstream
endobj
```

Clipped according to BBox



Otázky oponenta

- *„Vysvětlete, co znamená, že znaky „zapadají do rozmezí mezi znakem vykřičníku (!) a znakem tildy (~)“(str. 10 ve zprávě).“*

dec	hex	oct	char	dec	hex	oct	char	dec	hex	oct	char	dec	hex	oct	char
0	0	000	NULL	32	20	040	space	64	40	100	@	96	60	140	`
1	1	001	SOH	33	21	041	!	65	41	101	A	97	61	141	a
2	2	002	STX	34	22	042	"	66	42	102	B	98	62	142	b
3	3	003	ETX	35	23	043	#	67	43	103	C	99	63	143	c
4	4	004	EOT	36	24	044	$	68	44	104	D	100	64	144	d
5	5	005	ENQ	37	25	045	%	69	45	105	E	101	65	145	e
6	6	006	ACK	38	26	046	&	70	46	106	F	102	66	146	f
7	7	007	BEL	39	27	047	'	71	47	107	G	103	67	147	g
8	8	010	BS	40	28	050	(	72	48	110	H	104	68	150	h
9	9	011	TAB	41	29	051	)	73	49	111	I	105	69	151	i
10	a	012	LF	42	2a	052	*	74	4a	112	J	106	6a	152	j
11	b	013	VT	43	2b	053	+	75	4b	113	K	107	6b	153	k
12	c	014	FF	44	2c	054	,	76	4c	114	L	108	6c	154	l
13	d	015	CR	45	2d	055	-	77	4d	115	M	109	6d	155	m
14	e	016	SO	46	2e	056	.	78	4e	116	N	110	6e	156	n
15	f	017	SI	47	2f	057	/	79	4f	117	O	111	6f	157	o
16	10	020	DLE	48	30	060	0	80	50	120	P	112	70	160	p
17	11	021	DC1	49	31	061	1	81	51	121	Q	113	71	161	q
18	12	022	DC2	50	32	062	2	82	52	122	R	114	72	162	r
19	13	023	DC3	51	33	063	3	83	53	123	S	115	73	163	s
20	14	024	DC4	52	34	064	4	84	54	124	T	116	74	164	t
21	15	025	NAK	53	35	065	5	85	55	125	U	117	75	165	u
22	16	026	SYN	54	36	066	6	86	56	126	V	118	76	166	v
23	17	027	ETB	55	37	067	7	87	57	127	W	119	77	167	w
24	18	030	CAN	56	38	070	8	88	58	130	X	120	78	170	x
25	19	031	EM	57	39	071	9	89	59	131	Y	121	79	171	y
26	1a	032	SUB	58	3a	072	:	90	5a	132	Z	122	7a	172	z
27	1b	033	ESC	59	3b	073	;	91	5b	133	[	123	7b	173	{
28	1c	034	FS	60	3c	074	<	92	5c	134	\	124	7c	174	|
29	1d	035	GS	61	3d	075	=	93	5d	135	]	125	7d	175	}
30	1e	036	RS	62	3e	076	>	94	5e	136	^	126	7e	176	~
31	1f	037	US	63	3f	077	?	95	5f	137	_	127	7f	177	DEL

Otázky oponenta

- *„Bylo by obtížné do aplikace zakomponovat i opravu gramatiky, např. pomocí existujících knihoven?“*